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Britain's Domestic Need.

EFFORTS to accelerate the rate of progress in the application of electricity to the common purposes of life are a matter of direct interest to every reader of the ELECTRICAL REVIEW.

The domestic field is so wide, the soil so fertile, and the opportunity so obvious and open, that we find it hard to believe that any electrical man, whatever his specialised section of activity may be, can be apathetic or disinterested regarding a theme which becomes more and more fascinating as one contemplates the immediate possibilities or probabilities and the ultimate certainties.

Apart from this general appeal to every electrical man, there is the unquestionable fact that to all who have to do with the electrical trade—whether producers or sellers—Domestic Electrification is just now the foremost subject. British electrical industry in every one of its departments must become a bigger thing altogether as the domestic load approaches the anticipated proportions.

The national discussion that has been taking place on electricity supply legislation has been advertising the benefits accruing from electrical service, and the E.D.A.-E.L.M.A. propaganda scheme, providing the people with educational material and an interesting incentive, will help to hasten the electrification of our households, though we must not forget the rapid advance that was taking place in many well-cared-for areas before the origination of either of these influences.

It was a famous American President who remarked that God must love the Common People—He had made so many of them. The electrical industry has a special interest in what we too may term the Common People—the great un-electrified multitude. We have it in our

power to bring to them the greatest scientific aid to freer, happier, and better life in the many millions of British households which at the present time are groping in the old-fashioned ways of comparative darkness with the daily round far more monotonous and arduous and unhealthy than it need be because they are deprived of electrical facilities. Electricity, like Mercy, blesseth him that gives and him that takes—the Trade on the one hand, the Consumer on the other.

These preliminary notes representing the situation as it is to-day, we need no excuse for producing a Special Domestic Electrification Number of this journal wherein various leading authorities contribute articles dealing with the different Sections of the subject, while the products of many of our manufacturers who are striving to meet the demand for electrical appliances for the home are illustrated and reviewed so that the whole profession and trade may see comprehensively what goods are on the market.

The dispute in the Coal Trade, calamitous as it has been for so many, has, like all other troubles within our recollection in that industry, independently served to accelerate the rate of domestic electrical progress, for it has placed new emphasis upon the need for and value of alternatives to the coal fire. It has turned the public mind from contemplation of empty coal cellars to the necessity for hurried adoption of electrical and other alternatives. If the dispute had ended a month or two earlier, the electrical emphasis due to the coal shortage would have been weaker. The sudden fall in temperature a week before the end of "Summer Time" led many a local ironmonger and gas and electrical showroom to make stronger autumn displays than usual of heating contrivances other than those consuming coal direct. Manufacturers have been booking record orders for electric fires. On the other hand, the coal shortage led to a reduction in electric street lighting which in places has been reminiscent of air-raid days and to a ban being placed on advertising and festive illuminations; it has hampered the operations of electrical manufacturing works to some extent; but most unfortunate of all, it has compelled many electricity supply undertakings to advance their charges to consumers. This would have been a severe handicap to the "Homes of Britain" campaign but for the fact that the price of coal to the householder has risen substantially and for the advance that has been made in the price of gas.

The rise in electricity prices has been particularly unfortunate from the "other uses" standpoint, where it has involved a 50 per cent. addition to heating and general domestic rates, though 10 per cent. on the lighting charge has been found sufficient. While it is true that these changes are generally regarded as only temporary, it is unlikely that the advances will be removed before the end of the Campaign. We appeal, in the name of Domestic Electrical Development, and therefore in the early interests of the electrical industry, to electricity supply authorities—engineers and committees—not to advance charges for "other uses" more than is absolutely necessary. An eye to the future is the wise policy at this particular juncture.

The forced need for alternatives, it seems to us, must be co-operating admirably with the present Development Movement. It gives at the most appropriate hour that added stimulus to the householder to seek to know more regarding the availability, value, and superior service of electrical means, which the propaganda campaign stands for. The atmosphere is made for us by a deplorable calamity, at the very time of our long-planned intensive educational activity. When we remember that, speaking in the main, the electrical movement is a forward one—consumers seldom looking back from the electrical to older methods—we can rest assured that the forces now at work will have a permanent impression upon the private use of electricity. The movement should grow like a snowball until the millions of non-electrical householders fully recognise that they must launch out as soon as ever they can afford it.

The present campaign is primarily one for the better lighting of our homes; but that is only one of its objectives, and an early one at that. With electricity introduced for lighting, the habit of "switching on" is quickly formed, and every member of a household expresses appreciation of electrical facility. This is a great gain for electricity. One thing leads to another thing, and the switching habit spreads to other services besides lighting. The advantages of electricity have only to be demonstrated properly and they will win the favour of the populace, who will soon contrive ways of affording it if not already in a position to adopt it. Of course, there will always be people prejudiced in favour of other means, whether as shareholders in gas companies or for other reasons, but ignorance and disinterested prejudice can be effectively dealt with as the result of educative demonstration.

The trend of things to-day is in the direction of simplifying, humanising, and lightening the labour of life employed in the factory and the workshop. Scientific applications and enlightened organisation are relieving men and women, youths and girls, of many of the heavy and arduous operations that characterised the earlier stages of our industrial life. That movement has universal approval and good wishes. But the same trend is observable in the domestic field, and it is bound to grow. The Home stands for so much in British life and character that everything that can make it happier, sweeter, more convenient, and easier to run, is of immense importance. Notwithstanding superficial signs of tendencies to the contrary, and the housing shortage which operates so detrimentally, the heart of the British People is still deeply responsive to the sentiment that there's no place like Home. It is for the electrical profession and trade to rise to the occasion and strive to make it, however humble, a healthy and happy place by bringing to the aid of women all that electricity can, through its manifold contrivances and service, confer.

The Retailer, The Public, and Conservatism.

One important effect of the educational campaign in which the British electrical industry is now engaged should be the breakdown of conservatism that undoubtedly exists amongst British householders and housewives with regard to new mechanical labour-saving appliances. The enlightenment that is now being given will ease the way of change from the ancient to the modern by dispelling both ignorance and prejudice concerning the latter. But the conservatism of the purchaser is frequently responsible for indisposition to be up-to-date on the part of the retailer who is afraid, because of stocks on hand or of commitments entered into, to make an effective show of new lines. This point was mentioned by Sir Ernest Benn last week when speaking at the gathering of the Household Appliances Section of the London Chamber of Commerce. Sir Ernest, who admitted that in his business career he owed much to the retail traders of this country, tendered advice to those of their number who are interested in the domestic appliance section.

He counselled them not to be afraid of showing new contrivances, and remarked that it was characteristic of the conservative British people to look at new things, but with that extreme measure of caution that induced them to continue to buy the same old well-tried things for a time, though ultimately after having looked for a sufficiently lengthy period to break down their aversion to things new, they took the plunge and went in for the more modern appliance. These thoughts may be found to have an application in respect of electrical household equipment. Possibly some retailers are unable to run too great a risk of being left with old stocks because the newer lines quickly catch on, but no shopkeeper or contractor of enterprise will neglect the opportunity of effectively displaying the latest developments, for the public, though conservative here and there, can and should be kept interested; speaking generally, the old and the new will sell concurrently unless there be drastic supersession with regard to type.

Two Million Volts.

THE total destruction, during an electrical storm, of a small village in the Auvergne Mountains in France was recently reported. The hamlet is said to have been struck by lightning, all the 30 houses composing it being destroyed, and one man was burned to death.

It is fortunate, indeed a perpetual wonder, that such calamities are not more often heard of, for it is hard to conceive the enormous potential difference involved, and when a building does happen to be in the path of a lightning discharge to earth, the damage done to it is invariably out of all proportion to the energy which must be liberated thereby. Probably the nearest approach yet made to natural electrical pressures has been attained in America with the aid of six transformers, which are said to have generated an electrical pressure of 2,100,000 volts, causing an arc to jump across a 21-ft. gap between two plate electrodes.

Two years were required to assemble the equipment in a new laboratory which has been built, according to *Power*, for Prof. Harris J. Ryan by Stanford University, with the financial aid of electric power companies. The principal work to be carried out with it will be the investigation of methods of electrically transmitting power at exceptionally high voltages, and electrical phenomena associated therewith.

Safety—at any Price?

WE have pointed out that absolute safety from accident is an unattainable ideal. It is useless to multiply regulations and restrictions indefinitely in the hope of reaching it—accidents will continue to happen, in spite of our utmost efforts. So long as one can step off the foot-path in front of a motor-'bus, or fall from a ladder, one cannot escape the risk of serious or even fatal accident—but must we abolish 'buses and ladders for that reason? There is a limit beyond which the cost of safety measures becomes excessive in comparison with the risk involved and the results achieved, and in this country there is a strong tendency to overstep that mark. Of reasonable precautions we strongly approve, but we have no use for grandmotherly legislation.

A flagrant instance of officious interference with normal conditions which was recently brought to our notice prompts these remarks. An engineering firm had witnessed a demonstration of the use of a portable electric drill, and being satisfied with it, promised to place an order with the manufacturer—a well-known maker of portable electric tools. The order, however, was not received, and on inquiry as to the reason it was stated that the customer had been advised by a factory inspector not to use portable electric machines, because of the danger of shock through the machine becoming alive and the earth wire connected with it being broken. The inspector, whilst admitting that he could not prevent the firm from using such tools provided that they were fitted with a proper earthing arrangement, strongly recommended the use of portable pneumatic tools wherever possible—and his advice prevailed.

We cannot but regard this unwarranted action on the part of the inspector as mischievous and meddlesome in the last degree. Thousands of electric drills are in use in this country, but we do not call to mind a single instance in which a fatal accident has resulted therefrom. If the same principle were applied to other electrical apparatus, a deadly blow would be struck not only at the electrical industry, but at all industries employing electric power—and that at the very time when the Government served by this inspector is doing its utmost to encourage and develop the use of electricity for motive power in factories and workshops, in the hope of helping our manufacturers to compete with their foreign rivals. The absurdity of the position is blatant, and we hope that steps will be taken by the B.E.A.M.A. and other interested bodies to put an end to such injurious propaganda as this inspector is promoting. As a nation we are handicapped sufficiently already without being further burdened by the uninformed opinions of reactionary officials.

De Forest "Phonofilms."

THE "Phonofilm," as its name implies, is the combination on the same kinematograph film of picture with voice, or music, photographically recorded by Dr. Lee de Forest's method with the aid of a microphone transmitter, an "Audion" amplifier, and a gasfilled "Photion" lamp.

Standard kinematograph film is utilised; the sound record occupies a very narrow strip of film on the margin, but does not materially reduce the width of the picture, and the reproducing lantern is of the usual pattern, an attachment being added which includes a sensitive photo-electric cell of the type invented by Mr. T. W. Case.

Three years ago "Phonofilms" were shown for the first time in England; last year they were again demonstrated in London, and a good deal of money has since been expended on improving the reproduction. That the efforts of Mr. C. F. Elwell, B.A., M.I.E.E., and de Forest Phonofilms, Ltd., in this direction have met with a large measure of success became evident when such films were introduced three weeks ago as an item in the daily programme at the Capitol Kinematograph Theatre, London.

The synchronisation of the voice with movement of the lips, action, &c., may be described as exact for all practical purposes; its accuracy must be seen to be appreciated. More attention needs to be devoted to the reproduction of sound, which, however, even now is fairly satisfactory on the whole; in some instances the quality is good, but not always, and it would seem that when films of this type are being made, care will have to be exercised in choosing artistes for voice suitability—a matter which the British Broadcasting Co., Ltd., had to tackle. Moreover, while the amplifying system and loud-speaker employed are excellent judged by their performance during a preliminary announcement when the voice seemed to come from the direction of the screen, once the picture appears on the latter it is somewhat difficult to avoid the impression that the sound is not emitted from the mouth of the actor depicted on the screen. Criticism in the daily Press has been directed towards the attempt to reproduce an operatic performance, which, we agree, is a mistake. The system is, in its present state, incapable of dealing with musical items of that class, and it would seem to be a wiser policy to curb ambition until further development has been attained.

The problem is, however, far from being a simple one, and those concerned in the production of "Phonofilms" deserve congratulation for what they have achieved already, some of the films recently exhibited in London being by far the best examples of their kind. In modern invention, when the main scientific problem has been solved, development towards perfection follows pretty soon.

Domestic Load Development in Great Britain.

By R. P. SLOAN, C.B.E., President of the British Electrical Development Association, Inc.

There is to-day a general appreciation of the value of the domestic load to the electrical industry, and this has resulted in considerable efforts being made to develop it as rapidly as possible.

Future development in the use of electricity for motive power is, to some extent, limited, as it is safe to say that the majority of factories of any consequence already largely employ electricity for this purpose. Further power developments, therefore, are mainly dependent upon additional uses of energy being found within these industries.

The widest spheres for future development lie in:—

(1) Industrial heating.
(2) Domestic supplies (lighting, heating, cooking, &c.).
(3) Miscellaneous applications (traction, farming, refrigeration, &c.).

Of these, domestic supplies provide an enormous field, which has scarcely been touched as yet.

To quote from a speech of His Majesty the King last year: "No longer a luxury for the few, electricity has become a necessity for the many."

Some general conception of the ultimate possibilities of the application of electricity to the homes of Britain may be gathered from the following: There are some 8,000,000 houses in Great Britain which are "unwired" as yet—each of these houses would require, on an average, nine lights, representing approximately 0.4 kW per house. To wire these houses for lighting purposes alone, £80,000,000 and probably a good deal more at least would have to be expended on the installations, over 1,000,000 kW of power station plant would be required to meet the increased demands, while cables and all incidental material would be called for in proportion.

From the sale of energy for lighting purposes only, an annual revenue of some £35,000,000—or an increased revenue approximately equivalent to the total revenue received at the present time by all undertakers in this country—would be secured by the electricity supply industry, while the cost of lamp renewals alone would amount to approximately £2,000,000 per annum.

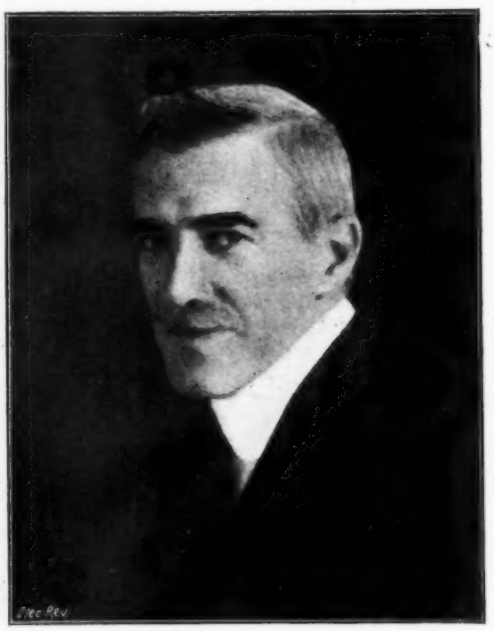


Photo by [*W. F. T. Pinkess.*

Mr. R. P. Sloan, C.B.E.

These are vast figures. But the use of electricity in the home is not confined to lighting. There are many thousands of householders to-day who have adopted electricity for cooking and other purposes, with the result that they have increased their annual consumption of about 200 units (for lighting) to 2,000 units (for lighting, cooking, and occasional heating), and, when it is realised that, where electricity is used extensively in the home, consumptions of 10,000 units per annum are not uncommon, one is able to grasp the enormous possibilities of general domestic supplies.

The "EDA-ELMA Campaign," which has just been launched, has for its object the wiring of the homes of Britain, and is the first co-operative campaign on a large scale between the two important Associations in the industry which are primarily interested in extending the use of electricity in British homes—namely, the British Electrical Development Association, Inc., and the Electric Lamp Manufacturers' Association.

It is hoped by means of this campaign to create an electrical atmosphere throughout the country, which, if followed up by local publicity and sales effort on the part of the various interests concerned, should result in a big forward step towards electrifying the homes of Britain.

The subject of future development would be incomplete without reference to some of the outside influences which have a bearing on this matter.

Much interest and discussion has been aroused as a result of the Electricity (Supply) Bill which is being promoted by the Government.

While the wide publicity given to this measure by the Press may prove to be useful propaganda, it is to be regretted that some of our politicians and many of our daily papers—through lack of any real knowledge of the economic problems involved—have misled the public into the belief that cheap and abundant supplies of electrical energy will be available shortly after the Bill becomes an Act of Parliament. The mere placing of this measure on the Statute Book will not effect any reduction in costs, nor will it create an unprecedented demand for supplies of electrical energy, and the responsibility for the failure speedily to bring about these desired results will no doubt be laid at the door of the electricity supply authorities.

This will be an unfortunate position, and particularly so as the majority of those engaged in the electricity supply industry take strong exception to many of the provisions contained in the Bill.

If the Government, in its anxiety to assist the industry, had concentrated on amending existing legislation and removing some of the restrictions under which the industry operates, its efforts would have met with greater success.

The means of bringing about any substantial reduction of cost to consumers lies in the hands of consumers themselves to a much greater extent than in the hands of the electricity supply authorities or of the Government. The greater part of the cost of supplying electricity is the charge on the capital required outside the generating station—for transmission and distribution mains and service connections—and it is only by consumers making greater use of this capital—which they can do by increasing their individual consumptions of electricity, and by increasing the number of consumers per unit of capital expended—that any substantial reduction of cost can be brought about.

Closely allied to the Electricity (Supply) Bill is the Housing (Rural Workers) Bill, as, if the Government's proposal for intersecting the country with main transmission lines should mature, it will enable certain rural areas to obtain supplies of electricity. In many parts of the country the average domestic load per consumer in rural areas may be expected to be greater than in the more densely populated districts. The lighting load will, of course, not vary to any great extent as between town and country districts, but, in consequence of the high cost of coal freightage, the use of electricity for heating and cooking should develop more rapidly in outlying districts.

Local Municipal Housing Committees throughout the country are beginning to realise the advantages of "All-Electric Housing Schemes," and it is not too much to expect that, in the near future, the majority of these schemes will have average connected loads of as much as 10 kW per house.

Another potential development in the domestic field lies in the economic solution of the water-heating problem. Electric cooking is already established, and only needs popularising by educational effort. The industry, therefore, should now turn its attention to the problem of domestic water heating, as this is one of the applications of electricity which, if concentrated upon, will make rapid strides within the next few years.

The Pure Food Act, with its consequent demand for electrical refrigerators, opens up further possibilities, while still greater results may accrue from the efforts towards smoke abatement, which should accelerate the demand for electrical heating in houses.

By the introduction of Assisted Wiring Schemes—which are now in operation in many parts of the country—there is a much greater prospect of wiring the artisan type of dwelling for lighting, and there seems little reason why such schemes should not be extended so as to provide also for heating and cooking supplies.

Another important direction in which the industry may look hopefully for assistance in development is by the reduction in cost of appliances, as a result of the present efforts towards standardisation which are being made by the British Engineering Standards Association, and by the manufacturers themselves. Apart from any reduction in the cost of the apparatus itself, standardisation of apparatus is of importance to supply authorities, as it will enable much to be done in the reduction of maintenance costs, thus assisting towards the reduction of the charges where apparatus is hired, and enabling a greater variety of apparatus to be included in hire schemes.

In the domestic supply sphere much has been accomplished, particularly during recent years, and the rapid extensions which have taken place in many parts of the country are all the more remarkable, as these years have been periods of great trade depression.

There still remains more to be done, and the measure of success achieved will mainly depend upon the individual efforts of those engaged in the industry itself, and by their adopting a more progressive policy.

"Help Us to Help You."

By J. W. BEAUCHAMP.

An appeal to the industry by the Director of the British Electrical Development Association for support in making the "Wiring the Homes of Britain" campaign a benefit to the nation and a gain to every member of the Electrical Trade.

Four months ago the design of our national scheme for developing the use of electricity in the home had reached an advanced stage; the building was yet to do, the reception it would be given unknown.

Four months ago the Electrical Development Association completed the first seven years of its existence, justifying the faith of its early supporters who have in that time witnessed a notable expansion in the co-operative publicity movement in many different trades.

In recent years the valuable work done by the many "joint" committees of E.D.A. has crystallised out into various definite enterprises, and some special feature or activity is now expected from the Association each year.

The growing resources contributed to our Development Association by all sections of the industry, and the invaluable extra help at present being rendered by the lamp makers, has made it possible to give the present campaign certain features of outstanding importance:—

Mr. J. W. Beauchamp, M.I.E.E.

It is designed to push the use of electricity for all purposes in the home, using as an introduction the advantages and fascination of modern electric lighting.

It has a strong business appeal to every trader, to all supply undertakings, whatever stage of development they may have reached, and its success is the less dependant upon the local price of electricity or the development of distribution facilities.

It attracts the non-user of electricity by offering an opportunity to start with light, a use of electricity which he or she can afford at any current rate, and one where the improvement over older ways is instantly manifest.

The campaign arises on a wave of interest in electric power and better housing which is being supported by the Press and Government.

This appeal to public interest is based upon the work of E.D.A. and E.L.M.A. headquarters, supported by the expenditure of a large fund, over six months.

The benefit of local knowledge and co-operation is secured by dividing the country into seven areas, with a strong committee of mixed electrical interests for each area.

These regional committees are each assisted by a paid officer working from the local lighting service bureau or office accommodation kindly afforded by a local supply undertaking.

The seven committees are charged with the duty of stimulating the creation of a large number of "circles" in the different towns and districts of their respective regions and directing the policy of these circles.

In this way we have an organised machine which will enrol the help and ideas of hundreds of people in

positions of responsibility within the industry, and afford continuous opportunities for them to meet for a direct and common object, with all the indirect advantages which such meetings under E.D.A. auspices have always been found to possess.

The central fund devoted to this campaign is much larger than has yet been available to the Association, and may easily be doubled by the amounts being spent by the circles or individual firms and electric supply undertakings, many of which are already planning to supplement locally our national advertising and in other ways add some direct local expenditure to increase the momentum of the work, and point it more directly towards their particular interests.

It would be difficult, however, in addition to this aggregated expenditure to assess in money the value of the time and thought being given to the work by employers and leaders in the business who are working on the committees, from the Council of E.D.A. and its supporting Associations to the least of the local circles.

The E.D.A. numbers some 1,500 member firms and electricity suppliers, representing the majority of the organisations in an industry which employs some 1½ million people; in effect this campaign offers to everyone of that vast body a member opportunity of helping, each in his or her own way and time, to forward the business in which all are engaged, and bring about a solidarity in public service effort such as we have never yet reached.

In spite of great progress made in recent years no real attempt at electrical colonisation of the country has yet been achieved. There are many "strongholds" of domestic electrification, but over most of the territory available we possess little more than scattered electrical outposts.

There is no reason to suppose that the present campaign may prove only to be a temporary effort—its success should encourage permanent work of this kind, and is calculated entirely to alter within a few years the outlook of the industry towards the domestic business.

This particular E.D.A. effort is of the more interest to the electrical industry as every member may regard himself as connected with it, not only as a trader but as a consumer. There can be few indeed who have no interest in any kind of home, or who are not in their lives and work directly influenced by any change which improves the efficiency and comfort of the households of this country.

Here, perhaps for the first time on a large scale, we recognise and approach the woman of the country, already the greatest "buyer" in daily life, and are trying to offer to her the invaluable service of electric power in a way which she will understand, and in the hope that soon her interest in electricity, and in the electric shop, will become as great as it is in the stores of those who purvey provisions, furniture and clothing.

In conclusion, the writer would remind everyone in the electrical industry that participation in this work cannot start too soon, and any co-operation until the end of the campaign in March, 1926, will not be too late.

Head office and district officers are at the service of everyone seeking information. The trade Press is kindly dealing with details of progress at frequent intervals, and the E.D.A. itself is publishing a campaign bulletin *The Home Lighting News*, which will serve as a medium of communication between the trade, the circles, and the headquarters of E.D.A. and E.L.M.A. at 15, Savoy Street, London.

The Lighting Business of the Industry.

By W. E. BUSH,
Manager of the Lighting Service Bureaux.

It is generally agreed that the big task before the electrical industry during the next few years is selling. With the passing through Parliament of the Electricity Bill in the coming months, the discussions on super-stations and grids will have reached a climax, and the engineering side of the business will proceed according to programme. Is not the time opportune, therefore, for serious consideration of the sales campaign which must be waged, in order that the many electrical blessings, which have been so liberally promised to the public, may become an accomplished fact?

Mr. W. E. Bush.

The impression created by speeches and Press articles during the past year is that the public are anxious buyers of electricity. They have been led to believe that, in some mysterious manner, a plentiful supply of electricity will be "laid on" to be as freely used as water, at a negligible cost. The man in the street has not yet realised that he will be expected to pay the cost of installation; his mind has been too much influenced by the promise of cheap units. To use an Americanism, the public have been "sold on the idea" of cheap electricity, and the time has now come when it is necessary to sell vigorously the idea of electrical installations to non-electrical consumers, and persuade existing consumers to invest in a more complete and up-to-date range of domestic lighting and labour-saving appliances. To ensure rapid development, and a quick return on sales and propaganda expenses, a careful analysis of the problem should be made in order that an efficient programme of activities may be formulated.

An attempt to sell the all-electric idea *en masse* to the millions of non-consumers would be a slow and unremunerative undertaking; the process of education must be gradual and put into operation in easy stages. The first step should obviously be a concerted effort to wire the houses for electric light, and thus pave the way for the sale of heating, cooking, and domestic appliances.

Although no accurate statistics exist, the data which is available indicates that, of the total homes in Great Britain, only 14 or

15 per cent. are wired, although between 60 or 70 per cent. are already within reach of the mains of existing supply undertakings. It is the pre-war properties that require particular attention. There is a close resemblance between the numbers of new electrical connections and houses built during recent years, which indicates that the industry is not yet making a serious inroad in the electrification of the older houses. There is probably no better index of the electric light development of any country than the consumption of electric lamps in that country, and the following figures indicate that on this basis Great Britain is seriously behind the other principal countries of the world:—

Increase of annual lamp consumption for the principal countries and areas of the world, over a period of 11 *years*—1911 *to* 1922.

Country and area.	Per cent. increase in number of lamps consumed.	Per cent. increase in per capita consumption.
Belgium	68	60
France	70	67
Germany	200	220
Great Britain	23	17.6
Italy	96	60
Netherlands	170	93
Spain and Portugal	40	14
Sweden	97	81
Switzerland	56	49
Total for Europe	96	49
Japan	405	114
United States	291	227

Light is still the easiest electrical service to sell, and must be the first stage in a broad scheme of domestic electrical development. Until the majority of the houses in the country are wired for light, the market for domestic electrical appliances will be limited. Due to the fact that by far the larger section of the population live in rented houses, it is extremely difficult for the industry to sell outright the wiring installations. Until assisted wiring schemes are inaugurated and actively exploited in every district, no serious inroad will be made in the electrification of the older houses. In the near future, big-scale publicity, coupled with easy payments, will become a necessity.

Another important problem which needs the serious attention of the industry is the education of the public towards the adoption of a higher standard of home lighting. The system employed in most houses is crude in the extreme, and has changed but little during the last 15 years. This is due, in a large measure, to the system of selling in the early days, which, in the main, still persists in the majority of electrical shops. Lighting equipment is offered for sale by the electrician on the same basis as ironmongers sell fenders, that is, price and appearance. The industry must accept as a fundamental principle that electric light fittings should render satisfactory service, in addition to being ornamental, and, what is more important, this fact must be instilled in the minds of the public.

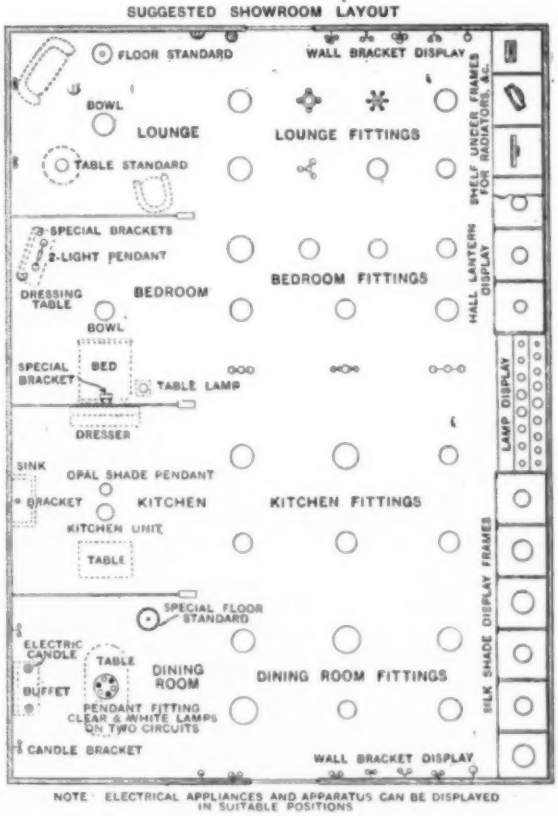
There is on the market to-day a range of lighting equipment which, in addition to being of good appearance, incorporates the correct principles of light distribution and diffusion; but such fittings sell in ridiculously small quantities compared with the tons of metal work of stock design that are purchased by the public from catalogues.

Conditions are not likely to change until the whole system of showrooms is reorganised. If the public are to be properly educated in the principles of good home lighting, it is essential that some means be devised that will enable the service of electric light to be demonstrated, in addition to presenting a stockroom of hardware for inspection. There are probably not more than half-a-dozen showrooms in the country where home lighting appliances can be demonstrated in the proper setting, and in some of these there is considerable room for improvement. The lighting service showroom should be so equipped that the sales assistant can explain and demonstrate for each room in the house the many facilities and comforts that can be obtained by the correct use of electric light. A complete suite of rooms adjacent to the main showroom is obviously the best solution, but where there are limitations of space and finance, a showroom can be adapted to serve a similar purpose.

The following illustration is a suggestion for the layout for a single interior showroom which, in addition to including a fittings stock, enables lighting service demonstrations to be given to consumers. On one side three partitions are erected, which divide the room into four sections. In each section a simple arrangement of furniture, with suitable decoration, can be made to suggest one of the principal rooms in the home, enabling the following demonstrations to be given:—

Dining Room.—Over the dining table is suspended a pendant fitting wired on two circuits. On Circuit No. 1 clear lamps are employed, the brilliant filaments of which can be seen through the silk shade, the result—glare and bad diffusion. Circuit No. 2 is fitted with white lamps which correct the above disadvantages. A special floor standard, containing a reflector at the top for general lighting and small lamps below for local lighting, makes an effective demonstration of a home lighting fitting, designed on scientific principles. Candle brackets and electric candles on the buffet provide the finishing touch. In the centre of the showroom, suspended from the ceiling opposite the dining-room section, are a number of alternative dining-room fittings varying in design and price, from which the customer can make a selection, while wall brackets may be shown on the side wall.

SUGGESTED SHOWROOM LAYOUT



NOTE ELECTRICAL APPLIANCES AND APPARATUS CAN BE DISPLAYED IN SUITABLE POSITIONS

Kitchen.—An opal shade pendant with a glaring gas-filled lamp can be compared with the well diffused light obtained from a modern kitchen lighting unit. Alternative kitchen fittings are available for inspection in the centre of the showroom.

Bedroom.—Specialities, such as bed lighting brackets, and dressing table lights, can be demonstrated, in addition to the usual pendants and table lamps which are common for the bedroom, alternative bedroom fittings being available in the centre of the showroom.

Lounge.—A bowl fitting with coloured lights, double-purpose floor standards, and wall brackets, can be demonstrated in the correct setting, and contrasted with the lighting effect from a crude electrolier. Alternative fittings and brackets being suspended from the ceiling and fixed on the wall, respectively.

The advantage of being able to show any one fitting in its proper environment, thus enabling the customer to visualise the effect in his or her own room, is obviously an important selling adjunct, but in ordinary show-

room practice a customer is expected to make a choice from a regular forest of fittings suspended from the ceiling. In the showroom layout described above it is suggested that special detachable ceiling plates be used, to one-half of which the fitting is attached; this fits into the other half, which is permanently fixed to the ceiling. At a second's notice it is thus possible to remove any one of the alternative fittings which may appeal to the customer to the model demonstration room where it may be seen in its right setting.

On the opposite side of the showroom, showcases or alcoves can be built for displaying silk and glass shades, hall lanterns, &c., and, at the bottom of each section on the floor, a complete range of electric fires can be shown. There should be in every showroom a lamp display cabinet or rack in which the full range of electric lamps for home lighting can be easily demonstrated, and the number of hours in which the lamp consumes one unit clearly indicated.

Domestic electric appliances can be displayed throughout the showroom in suitable positions. With such a showroom arrangement, there is unlimited scope for the demonstrator, who has the opportunity to impart really useful advice to the customer and is not limited, as is so often the case, to merely stating the price of the fittings on show.

The electric lighting industry will progress much more rapidly if service is sold in addition to goods. Our competitors are strong and clever in their business methods. They can make handsome fittings and produce brilliant light sources, but they have many limitations in application. Electricity has all the advantages of simplicity, adaptability, and convenience, but we do not make the most of the opportunity which we have, by educating the public in the super lighting service which we can give. We have played the smaller trumps and still have the big cards in our hands.

Coloured lighting for the drawing room, brackets for the bed, lights on the dressing table, table lamps, floor standards, kitchen units, and numerous other lighting appliances, need to be sold in millions before the homes of Britain can enjoy to the full the greatest of all electrical conveniences. The E.D.A.-E.L.M.A. Home Lighting Campaign, if vigorously supported, will have a tremendous effect in improving the standard of lighting to the advantage of both the public and the electrical industry.

The Progress of the Campaign.

Points from Mr. Dale's Address.

Last week at conferences held under the auspices of the Electrical Development Association, in Newcastle and London, Mr. V. W. Dale reported the progress already made in the E.D.A.-E.L.M.A. campaign. Mr. H. J. Miles, M.I.E.E., president of the Electrical Contractors' Association, occupied the chair at the opening conference in London on Friday last at the Royal Society of Arts.

Mr. Dale said that the campaign marked the birth of a new era not only in the electrical industry, but in the homes of the people. Beneath electrical salesmanship and propaganda was a real desire to promote public welfare; that was the secret of electrical enthusiasm. It had to be realised that the principal industry in this country to-day was not the coal industry, but the business of the home—bed-making, cleaning, cooking, and washing. Even rivals admitted the amazing labour-saving qualities of electricity, and if it could cut the labour of the home-maker in half, as it was doing, then it was correct to claim that electrification propaganda was more than commercialism.

Coming to the Campaign, Mr. Dale outlined the history and work of the Electrical Development Association. He maintained that the progress which had been made during the past two or three years could not have been achieved by salesmanship alone; it was essential for a "barrage" of national propaganda to precede it. Since 1924, when the Association organised its British Empire Exhibition display and the members decided to quadruple their subscriptions, the electricity supply membership had increased 50 per cent., and the total revenue by between 300 and 400 per cent. That had made the campaign possible. Dealing with the explanatory booklet, he said that unless it was thoroughly studied it was impossible for everyone to give the disciplined assistance which was necessary. Up to date nearly three-quarters of a million booklets had been sent out; of those, contractors had taken about 480,000 and supply authorities 215,000. In addition, the Association had sold and circulated over 400,000 consumers' pamphlets, 976,000 poster stamps, 9,850 window bills, 489 art prints of the prize house, &c. The outstanding achievement of the campaign was the way in which all electrical interests had united in the furtherance of the common cause, in many cases sacrificing their former conceptions. Mr. Dale emphasised the fact that the members of the E.D.A. had not been called upon for any additional funds for the campaign. All that the contractor had to spend upon each "prospect" was one penny—the cost of the booklet. The main objective was to get that booklet into the hands of as many people as possible, and the success of the campaign depended upon the efforts of members of the industry to do that. It required central organisation to promote the campaign, but it needed individual service to carry it through. It was most important to organise local circles wherever possible. Already 43 had been set up and were at work in all parts of the country, and there were good prospects of the formation of many more. There should, however, be 500 of them working before another month passed. Even if there was not the remotest possibility of running a demonstration electric house, the circle was still necessary.

Mr. Dale proceeded to give a number of examples of the ways and means being adopted by various people to help in the campaign, among which were the following:—A contractor had borrowed a window belonging to a friendly main-street draper for an electrical display. A supply company, being unable to obtain a house for demonstration purposes, was converting one of its showrooms into the various "rooms" of a house successively. A supply engineer had guaranteed £1 for each pound contributed by the local contractors. Contractors in a Midland town had raised £150 and the supply engineer was asking his committee to add a similar amount. A London undertaking had formed a circle with its staff and had appointed a lady demonstrator to interview applicants for the booklet. Sixty-seven undertakings and firms were repeating the campaign advertisements in local papers. One contractor was exhibiting a painted sign, 46 ft. square, showing the prize house. The speaker urged the necessity of talking to the applicants for the booklet, and said that personal visits to their houses would repay the trouble and create a good impression.

He believed that the outcome of the campaign would be the awakening of the public, and results would continue to accrue after its cessation. It would lead to an enormously increased demand not only for energy but for all classes of electrical goods and apparatus. It was foolish to expect those results immediately, but the seed was being sown and the harvest was certain. In conclusion, Mr. Dale once again emphasised the necessity of co-operation between all branches of the industry.

Domestic Load Developments on the North-East Coast.

By W. F. T. PINKNEY,
Engineer, Lighting and Heating Department, Newcastle-upon-Tyne Electric Supply Co., Ltd.

It has always been the policy of the Newcastle-upon-Tyne Electric Supply Co., Ltd., and Associated Companies, to cultivate the small consumer. It was, however, decided a year or two ago, in recognition of the very valuable revenue derivable from this class of consumer, to make a more vigorous effort to develop the domestic supplies for lighting, heating, cooking, and other applications.

For reasons which need not be gone into here, the North-East coast has been harder hit probably than any other area in the country, and for a longer period, by the trade depression. This has resulted in a reluctance amongst those resident in the area and dependent upon it for a livelihood, to incur any unnecessary expenditure, and has made it more difficult to get premises wired than it would be in normal times.

The rate of increase in consumers in the post-war period up to 1922 was from 1,000 to 1,200 per annum. In 1923 more educational work was done—by educational work I mean bringing to the notice of non-consumers the advantages of using electric service—and in that year the increase in the number of consumers was 2,550. This increase was mainly among shops and better-class residences, but it indicated that any increased effort to secure new business was rewarded.

In 1924 the two-part tariffs available were modified and simplified, and improvements made in the service given to consumers. A new departure was also made in the organisation by employing a small section of outside salesmen, who were engaged solely in canvassing for new business, and were in addition to the assistant engineers already employed in each town or district as consumers' representatives.

The rate of increase in small consumers connected during the period 1922-25 was as follows:—

Year.	No. of consumers connected.
1922	1,200
1923	2,550
1924	3,480
1925	5,800

It will be noted that in 1925 the increased facilities afforded to consumers and the more vigorous policy adopted, resulted in a large increase of new consumers connected in that year.

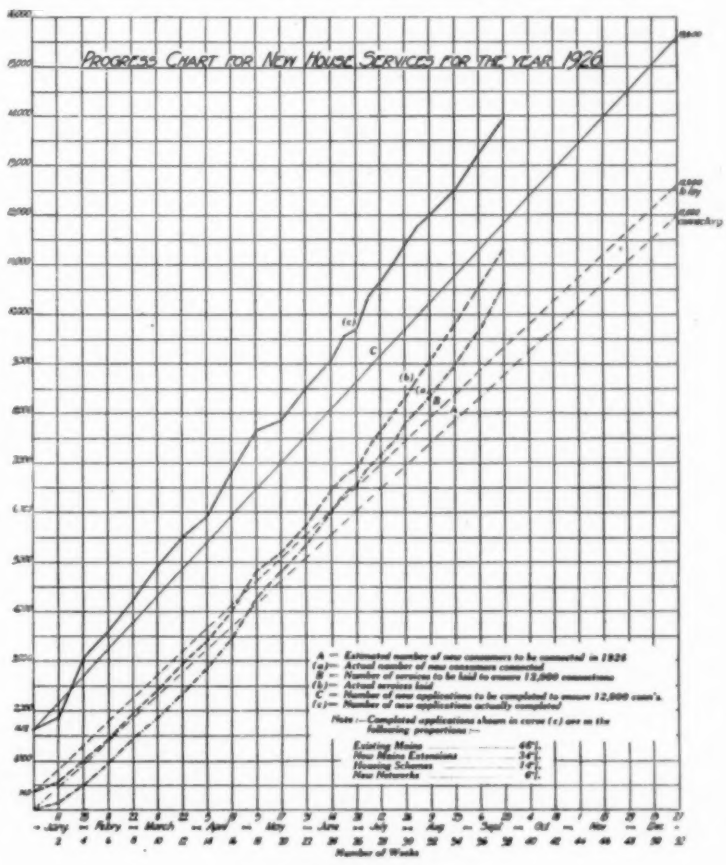
In the autumn of 1925 an estimate was made of what could be achieved with the then existing *personnel* of the business-getting department and with the company's organisation. For the purpose of the estimate, consideration was given (*a*) to the amount of business which would come in automatically and unsought; (*b*) to the number of non-consumers who could be canvassed; and (*c*) to the average percentage of non-consumers canvassed, who, as experience had shown, would agree to take supply without undue delay. From these factors alone we calculated upon a possibility of connecting up 14,000 new consumers in 1926, nearly three times as many as in the previous year. This seemed rather a formidable figure, particularly as the coal dispute was even then casting a shadow, and we knew that such a dispute would be another severe blow to the prosperity of the area, so the estimate was reduced somewhat in order to be on the safe side, and a programme of 12,000 new consumers to be connected in 1926 was officially adopted.

This, then, was our aim—12,000 new consumers, and more if we could get them, not neglecting, of course, the necessity to try and make existing consumers extend their use of our service. The accompanying curve shows the progress made up to a recent date.

It will be observed that we have been below the datum line during the first few months, but this is to be expected, as the rate of new connections amongst domestic consumers is always accelerated during the later months of the year. It seems evident that the estimated figure will be exceeded.

Assisted Wiring.

Much of the business could not have been secured if every prospective consumer had had to put down a considerable sum of money for wiring and equipment.



Progress Chart for 1926.

The company has for years offered an "easy-purchase" scheme to consumers, *i.e.*, any consumer can purchase an installation or any current-consuming apparatus by instalments over 12, 18, or 24 months, but that system was not sufficiently popular to enable us to secure new consumers in the numbers now aimed at.

In September, 1925, we re-introduced hired wiring, which is really a 10-years' easy purchase, and this hired wiring is easy for consumers to adopt—the fewest possible restrictions having been introduced. These hired installations may be purchased outright at any period at a predetermined figure, or a consumer may at any period elect to be transferred to an easy-purchase schedule, *e.g.*, for an installation of, say, 10 lights and two plugs, the selling price at time of installation would be £14. At the end of, say, four years the consumer

who hired his wiring at the outset could complete the purchase of the installation for £9 11s. 8d., or could be transferred to the easy-purchase schedule for 12 monthly payments of 16s. 9d.

Hire of Appliances.

In addition to the easy purchase of appliances, there is a fairly large range of appliances which may be hired. These include cookers of different sizes, kettles, irons, electric fires, &c. All hired appliances are maintained by the company, as are those on easy purchase until completion of purchase.

Organisation for Securing Consumers.

The area covered by the Associated Companies is extensive, and each district, which may be a town or group of villages, or perhaps both, has a district representative, who is an engineer competent to advise consumers on all matters. If the area is sufficiently developed electrically, there will be a local office and showroom. These district representatives are very fully employed, as all new business passes through their hands, and they are in touch with local councils, trade organisations, &c., and are known personally to as many consumers as possible. The district engineer is a link between the consumer and the company, and he gives the consumer the best service he can and secures as much business as he can. He may have an assistant or assistants according to the circumstances of the area for which he is responsible, and he can requisition the services of the Canvassing Section.

Canvassing Section.

This section of outside salesmen has proved of great service since it was started. Six of these canvassers were employed experimentally in 1924 and proved of value. There are now 24 canvassers divided up into sections of six, each section operating under a section leader. As a result of experience, they can be trained in their duties very quickly. The full section of 24 canvassers has been in existence for the whole of the current year; the results of their activities may be of interest and are given below:—

Value of sales effected	£4,450
Number of lighting applications obtained ...	10,463
New heating and cooking connected, in kW	395
Total cost of section, including transport and all expenses	£4,276
Approximate annual profit from sale of energy from new business secured	£8,840

Demonstrations.

A staff of competent lady demonstrators is kept. Their duties are to give lectures and demonstrations in the company's premises, at consumers' houses, and elsewhere, on cooking and other uses of electricity. In addition, they endeavour to call upon every new consumer connected, about one month after connection, to see that the consumer is contented with our service and to tell him something of the advantages of extending the use of that service.

Maintenance.

In addition to the maintenance of hired and "easy-purchased" appliances, consumer-owned appliances can be maintained by contract; such appliances must be of approved British manufacture and in reasonably good condition when the contract is entered into. The following table shows the terms for maintenance to be fairly reasonable:—

Apparatus.	Monthly maintenance charge.
Electric fires	2d.
Irons	2d.
Kettles	2d.
Toasters	2d.
Coffee percolators	2d.
Water heaters { (Watson Norie)	3d.
Water heaters { (Belling) ...	1d. per immerser.

The promptness with which attention can be given to consumers' maintenance requirements, and to fault repairs and fuse renewals, varies in the different districts. In the larger towns attention to all calls is given by motor-cars fitted with all spares likely to be required. Something like fire-station service is aimed at, and efforts are made in particular to give urgent attention to the more serious faults, such as on cookers or lights-off in shops during business hours. This question of prompt service to consumers is very important, and it is hoped to extend it and develop it very greatly in the future, but this can only be done as the density of consumers is increased. The appreciative letters and comments that we receive from consumers show that prompt service has its publicity value.

Publicity and Campaigns.

There can be little doubt that the E.D.A. activities during the past few years have contributed greatly to the development of the domestic load, and the ease with which domestic consumers can be secured is due to the fact that the seed of local propaganda falls upon ground already prepared by E.D.A., but it is the combination of E.D.A. and local effort which produces the best results.

It is doubtful if the E.D.A. has had full credit for all it has done. Those authorities which have supported it can have little complaint of full measure of value, and those who have not done so but have participated in the benefits of E.D.A. activities—as they must all have done—it is hoped will relent and bear their share of the cost of the good work of the Association.

The company's advertising section carries out a certain amount of publicity in the local paper at all times, and also conducts seasonal campaigns by special publicity mailed direct to consumers. During the next six months all such local publicity will "tie in" with the E.D.A.-E.L.M.A. campaign as much as possible. Poster advertising is carried on continuously, and all the company's motor vans are fitted with frames to carry the company's posters, which are changed from time to time. Special campaigns may be inaugurated for special purposes, and the following two are examples of what has been done this year. It seemed likely during the months of July and August that there was going to be a falling-off in the rate of new applications, and also we were feeling dissatisfied at a decline in the sale of electric kettles. The showroom stock was carefully gone through, and it was found that there were a number of pendants, 2-light fittings, 3-light fittings, and bowl fittings which were "hanging fire"; instead of adopting the usual practice of having a sale and selling these off at reduced prices, we decided to offer one free to any new consumer who made application after a certain date in July. It is impossible to say if this actually stimulated the rate of securing new business, but it certainly gave us an opportunity for additional publicity; the rate of applications was maintained during what is usually a slack period, and the fittings disappeared very rapidly, making room for newer stock. Interest in kettles was stimulated by offering to any monthly or quarterly account consumer who purchased, easy-purchased, or hired a kettle from the company between given dates, a voucher for 10 free units, to enable the consumer to "try the kettle at our expense." During a period of five weeks 184 kettles were sold or hired. These two examples are given as indicating our efforts to carry out what one might term "opportunist" publicity.

Model Houses.

Another form of publicity which we find of great value is exhibition houses. We try to have one of these in each residential area every two or three years, which means that we are running them fairly continuously during the winter months. They are an extremely valuable form of publicity. They are extraordinarily good educational work from the electrical point of view, and they give the staff very good opportunities for getting to know their consumers personally.

The Future.

It is not possible to say exactly what our programme will be within the next two or three years, but it is

certainly intended that it shall be vigorous. In planning our activities for 1926 there was no necessity to take into consideration the ultimate possibilities of the area. We knew that, no matter what efforts were made, we could not get near saturation. It would seem, however, that in future we shall have to be guided by what are the possibilities of the different districts. In some districts there will be mains in every residential street by the end of this year, and it is therefore quite likely that we shall secure in such districts somewhere near the total possible consumers; even so, however, there will be plenty of room for activity in extending our service for uses other than lighting.

In the seaside residential area at Whitley Bay and Monkseaton the total number of premises is 6,157, and of these 4,466 were wired up to the end of August, 1926. The saturation, therefore, up to that date was 72.6 per cent. In January, 1925, the saturation was only 45 per cent., so that considerable improvement has been made in the last 18 months. Other areas are now under review, and a survey is being made with a view to bringing them up to a similar fairly high state of saturation.

It is anticipated that during the next few months a very great deal of value will be obtained from the "Wiring the Homes of Britain" campaign, and we hope to secure the greatest possible benefit to ourselves by vigorous co-operation in that campaign.

Women's Contribution to Electrical Development.

By CAROLINE HASLETT

Director, Electrical Association for Women; Secretary, Women's Engineering Society.

Taking place in our midst to-day are two outstanding phenomena of the greatest national importance—one, the inevitable development of things electrical in this country; and the other the increasing interest of women in all kinds of activities, including those relating to public affairs, industry, commerce, and scientific home management.

The man, as electrical engineer, has laboured, toiled, and invented for nearly half a century to adapt to the use of man the great force of nature known as Electricity. Success beyond his hopes has attended his efforts in all things concerned with production, and he has been no less successful in finding markets in the industrial world for his products. As a salesman and demonstrator he could hardly fail, because the tools he employed, and the language he used, were those of his customer, who generally was another engineer.

During the last few years a great new problem has arisen—that of adapting and using electricity for domestic purposes, and of interesting a potential customer in whose mind the word "electricity" is probably connected with something unknown—a force which only the very highly skilled person can understand, full of technical difficulties, and so, because technical questions seem so obscure, difficult to master. Even so, the introduction of expert salesmanship into this field has achieved remarkable results in a comparatively short space of time, but it is admitted by all persons of knowledge and foresight, that the field has, as yet, barely been scratched.

We learn from the new E.D.A.-E.L.M.A. campaign that out of 10,000,000 homes in Britain only 1,400,000 are wired for electric service.

Now this state of affairs is not due to the lack of desire for electricity in the home on the part of the people of this country. We have very good reason to believe that there is everywhere a genuine desire for for the tremendous advantages which electricity brings its train. The woman who toils so wearily, and yet so unceasingly, against dust and smoke and dirt, has yet to consider this as a birthright—a blessing belonging equally to all and at the service of all.

We seem, then, to visualise the problem, which surel is to meet in an intelligent manner this great potential demand.

The atmosphere is being created in which women no longer feel that electricity with all it means to them, is a dream of an ever-receding future, but is an actual every-day reality.

F. A. Swaine] [London.

Miss C. Haslett.

What are the difficulties in the way of the realisation of this dream? There are undoubtedly questions of cost and obstacles with regard to actual supply, but above all, there still exist amongst the women of the country vague fears and doubts as to the difficulty of *using* and *understanding* electrical appliances. In many cases we have actually come across the somewhat unbelievable idea that at any moment the whole installation might "blow up!"

It would seem, therefore, that there is a very distinct psychological issue to be faced. If this is a correct estimate of the state of affairs, then what is needed is a new orientation of all our selling methods based on the need for gaining the confidence of the home consumer, and confidence in this connection can only be gained by those who understand the psychology of the house-wife, based not only upon her economic needs, but paying regard to her belief in the risk and danger to which lack of knowledge chiefly ministers. Not only interest but confidence must be created and maintained.

It appears that here is work which could be carried out by women of good education, broad-minded, sympathetic, and fully trained for their job. Excellent work of this character is already being done by a few pioneer women in different parts of Britain to-day, and also by a number of electrical authorities, but such a problem is too vast for sporadic efforts of this kind.

What is wanted is a systematic tackling of the question in the only way to command and deserve ultimate and lasting success.

Such women as we have in mind are those who combine personality with business acumen, who would be able to discuss with their customers the lay-out of the proposed electric home, and give advice on those hundred-and-one-details, the lack of which may be instrumental in preventing that extension of electricity to which we look forward with so much confidence. After installation it should be the duty of these women to keep in touch with and visit the homes in which electricity has been installed, and to be ready at all times to offer advice and help with regard to maintenance.

Such women as we here visualise would act as a link between the consumer and the supply authority, contractor, or manufacturer, as the case might be; and they must have an assured status, with commensurate salary.

Undoubtedly, such posts would quickly attract the well-educated woman, and for some of the more responsible posts the University-trained woman could no doubt be secured. Indications are not lacking to show that the idea is already commanding the active interest of educational authorities in the woman's world, and the co-operation of such authorities could be confidently relied upon in connection with any scheme of training which might be inaugurated.

It would be the duty of the industry to consider how best such women could receive an intensive course of training in the art of salesmanship and in the necessary electrical knowledge, having previously taken one of the recognised courses in domestic science.

Sooner or later this side of the problem must be considered, as increasingly the woman customer will demand that those who discuss her electrical installation with her shall be as intelligent and as well educated as herself.

Such a woman customer will demand from the saleswoman a complete knowledge of the apparatus, and the capacity to answer the many questions which will arise in her mind at the stage when she is about to adopt electricity in her home.

The old idea that women cannot understand technical matters has tramped the highway of our thoughts too long. Its hoary head will soon be but a reminiscence. The awakening has been a slow process, and its present hastening is due to the introduction into the home life of motor cars, wireless, and other mechanical contrivances. Women can no longer afford to be unintelligent as to the use of a screwdriver or the working of an engine.

It may be of interest here, briefly to survey the work of some of the pioneer women in the electrical industry. What these women have done on an individual basis is the promise of what women will be able to do with the greater co-operation which the industry seems now ready to offer. While no doubt for some time there will be few women who can call themselves "electrical engineers" in the full sense of the term, still, the time has now undoubtedly arrived when all women in the electrical industry who are engaged as saleswomen, demonstrators, or in any other capacity, must have a working knowledge of electrical terms and an understanding of some of the fundamental principles underlying electrical development of to-day.

The first and most outstanding woman in the electrical field was undoubtedly the late Mrs. Hertha Ayrton, M.I.E.E. Although Mrs. Ayrton was mostly known as a scientist of great merit, in a book recently published on her life by Miss Evelyn Sharp we learn that Mrs. Ayrton so far back as 1888 realised the need to give simple talks to the lay woman on the uses of electricity in the home.

In pre-war days hers was a voice crying in the wilderness, but her influence has been of great service to women, for which one day perhaps her sex will grant to her its meed of praise.

During the war period many old traditions were broken down owing to the need for harnessing all the nation's resources.

Amongst those who saw the value of the work of the educated woman in industry, and the possibility of women's aptitude with regard to the technical side of electrical development, was the Metropolitan-Vickers Electrical Co., Manchester. Amongst the women doing excellent work on the technical staff of this Company is Miss G. L. Entwisle, A.M.I.E.E., who has now taken over the honorary secretaryship of the Manchester District Branch of the E.A.W., thus bringing about the co-operation of the technical woman and the lay woman.

Mrs. Matthews, who first conceived the idea of an Electrical Association for Women, is herself engaged on the commercial side of the work of an important firm manufacturing electric tools.

The work of Miss Margaret Partridge, B.Sc., is now so well known in the electrical world that all we need say is that her training and knowledge have enabled her to bear a very large share in the inaugural success which has accrued to the E.A.W. Incidentally, Miss Partridge, in her business as an electrical contractor, is giving a practical electrical training to two girl apprentices. This is an interesting experiment which might quite possibly form the basis for a training scheme such as is here foreshadowed.

The extent to which women are taking part in technical engineering work is indicated by the fact that the Institution of Electrical Engineers has now nine women members in different grades of membership.

Dr. Margaret Fishenden is carrying out some very valuable original research work in connection with house heating, and many of her books are regarded as standard works on this subject.

The name of Alderman Mrs. Hammer is a household word in Hackney, and is also known throughout the electrical world. As vice-chairman of the Hackney Electricity Committee she holds a unique position for a woman, and in her own inimitable way is contributing her full share to the popularising of the electrical idea to the woman in the home.

The organising ability shown by women in the electrical world is ably demonstrated by Miss B. J. Lanfear, the extremely capable secretary of the Incorporated Municipal Electrical Association.

Mechanical and technical aptitude is of the highest importance, but no less so is the capacity to organise and develop new avenues of service. Work of this kind is being very able carried out by Miss Anna Holm, of the Newcastle-upon-Tyne Electric Supply Company. Miss Holm has, we understand, been asked to lecture at local girls' schools and domestic science centres, and here again is an avenue of educational work which should merit the closest attention of all those interested in electrical development. While mention might be made of the work of many other women in this field of service, the personality of Miss R. F. Kennedy, of the Glasgow Corporation Electricity Department, stands out as that of one whose success has been achieved by a whole-hearted belief in the tremendous advantages which electricity has brought and can bring to alleviate home drudgery.

The above examples, taken from widely different spheres of work, serve to show the many directions in which women are now adding their quota to electrical development in this country. These individual cases stand each on its own basis, and are the product of special circumstances and individual opportunity.

Such women may be regarded as the pioneers, but the time is now ready for an organised and comprehensive plan such as only will meet the case in the domestic electrical world.

The industry should seriously consider the training of a number of skilled and capable women who would act as "Electrical Advisers" to the actual or potential woman customer, thus creating an entirely new type of post which would not conflict in any way with work already being carried out. It is in fact one of those happy spheres in which the work of men and women should dovetail in a remarkable way, and should ultimately result in a selling organisation in the electrical world which would be second to none.

The economic facts of the industry will eventually force us to this conclusion, but there is still time to take the long view and prepare our organisation for the great push which must inevitably come.

Selling Electricity.—I.

Some Impressions of American Methods.

By R. HARDIE,
Glasgow Corporation Electricity Department.

The writer having recently sojourned for a few weeks in the Eastern sector of the United States, the impressions formed during what resolved itself into a "busman's holiday" may be of passing interest The trip was the culmination of a long-cherished dream, because having kept assiduously in touch, by means of all available trade journals, with the activities of the American electrical industry, I wished to confirm the claims made by them, or in default thereof, to ascertain if we were correct in suspecting the said claims to be mostly "hot air."

High Percentage of Wired Homes.

In the course of my inquiries I visited fourteen cities between New York and Chicago, and in conversation with the various executives learned that approximately 80 per cent. of the people used electricity for lighting their homes. I did not go to Salt Lake City (Utah), which boasts of the saturation figure of 99.8 per cent. Truly, our own country suffers by comparison with its 15 per cent. wired homes (a liberal estimate in A.D. 1926). I found that Cincinnati and Philadelphia, both famous for their active propaganda in house-wiring business and selling methods, had discontinued their special efforts to wire houses, owing to the fact that the task was practically completed. While their campaigns lasted, however, they each succeeded in wiring from 30,000 to 40,000 houses per annum.

In 1915 Philadelphia had 69,000 customers.

In 1925 this had been increased to 412,000 customers.

This business was obtained by strenuous endeavours on the part of large staffs of outside "solicitors," many of whom have now transferred their energies to the sale of energy-consuming devices to the wired houses.

W. Ralston] [*Glasgow.*

Mr. R. Hardie.

Other Uses.

Everywhere one found that large numbers were possessors (or at least in process of possession by means of various schemes of hire purchase or easy payment) of motor-operated vacuum cleaners, clothes washers, refrigerators, and the hundred-and-one electrical labour-savers now available to take the burden of housework off the house-wife's back. Too often it is assumed by the British public that the slow progress in our country is due to the high cost of electric service here. This is not strictly true, but although careful investigation discloses the fact that the prices charged for electricity in the United States are generally higher than those obtaining in the United Kingdom for equivalent service, in fairness it must be granted that the higher earning powers of American consumers offset in a large measure the higher prices ruling for electricity supply. Again, the cost of wiring one's house is much lower with us, but this is not surprising when one remembers that the average American wireman's wage is £2 per day. The wages of other building trade operatives are even higher, *e.g.*, in Chicago I found over 2,000 plasterers, who had been receiving 6s. per hour, on strike in support of a demand to have this increased to 7s. per hour. But if we consider the cost of electrical appliances for the home, the British house-wife, with an income of less than half that of her American sister, is asked to pay 25 per cent. to 50 per cent. more for a vacuum cleaner, clothes washer, coffee percolator, or other device. For example:—

Vacuum Cleaners.

	Selling price in United States.	Selling price of identical machine in Great Britain.
Type A.	£10 0 0	£16 16 0
Type B.	£14 0 0	£17 17 0
Type C.	£15 10 0	£21 0 0

Further, she is usually called upon to pay the bill in one fell swoop, while all over the United States payment may be spread over a period of from twelve to eighteen months. In Chicago, for example, one can have an electric refrigerator valued at £60 installed on two weeks' trial, absolutely free of cost. Small wonder that the estimated minimum sales from that showroom for twelve months are one thousand refrigerators! May not this disparity in price and collection methods be one explanation of our relative lack of progress?

Easy Business.

The impression formed from close investigation was that their business is more easily obtained than ours. I say this with a full appreciation of the virility of their outside solicitors or "bell-pushers," and with a ready acknowledgment of the originality and pertinacity of the personnel of their selling organisations. It is sometimes said that anyone who can withstand the rigours of our Scottish climate can live under any sky, and I feel sure that anyone who has attempted to do business in Great Britain, where, apart from the comparative penury of large sections of the community, one has to face the innate conservatism of those possessing the requisite resources, will agree that a salesman's task here is infinitely harder. America has undoubtedly a buying public. All classes appear to be in receipt of a regular income which enables them to live well and spend money freely on what we term "luxuries." The number of artisans possessing automobiles is a case in point. The dread of spending one's last days in the workhouse appears to be non-existent.

Easy Payments.

I do not propose to pronounce judgment on the policy of selling merchandise by "easy payment." The soundness or otherwise of this method is at present, I believe, the subject of discussion in U.S.A. financial quarters, but from observation I cannot see any good reason why this method of doing business should not persist.

Rather, it appears to me an explanation of the prosperity met with everywhere in my travels. It certainly was accountable for most of the huge business one encountered in every supply company's showrooms. One central station that I visited sells 12,000 vacuum cleaners per annum; at the risk of repetition let me state that from 80 to 90 per cent. of this huge appliance business is done on extended payments, and I was assured that the collection of instalments offered no difficulty. It makes it possible for one company amongst others to dispose of 800 clothes washers, of value £30 each, and 2,000 vacuum cleaners, of value £10 each, in the space of thirty days. In the case of vacuum cleaners an initial payment of 5s. puts the appliance in one's home. In another town, for 14s. down you can have a £30 washing machine, and 30s. per month for twenty months completes the payments.

On reflection it would appear that if we are to develop this large-appliance business it will probably be by the adoption of similar methods. Those American manufacturers who, not content with their almost unlimited home demand, are endeavouring to permeate our market, are proceeding, wisely I think, on the assumption that human nature is much the same all the world over. The old objection to hire purchase, deep-seated though it be, is already showing signs of breaking up, and we are rapidly growing accustomed to the principle of easy payments, whether in the acquisition of a dwelling house, motor car, house furnishings, or pianoforte. Electricity supply authorities, particularly those threatened with the loss of their generating powers and forced into the selling of electricity and merchandise, will, therefore, in all probability find it profitable to adopt this principle, even though it may clash with their previous staid conception of respectable business-getting. If they fail, then manufacturers will probably contrive to get along without their co-operation and do the business direct. Humbling though it may be, one cannot shut one's eyes to the fact that the remuneration of a first-grade American salesman of a good speciality will often bear comparison with that of the chief engineers of many of the smaller-sized electricity undertakings.

Showrooms.

The showrooms visited, while perhaps not teaching much with respect to lay-out, were in the main admirably adapted for doing business. The "Complaints" desk usually bears the more euphemistic title "Adjustment of Accounts," and over every desk the name of the presiding official is indicated, invaluable for reference. Electricity bills are payable there, and this ensures a steady flow of callers—the chief objective. In one showroom I was told that in one month 12,000 people had called to pay their electricity bills. They invariably have to pass several "live" demonstrations on their way to the cashier. Monthly bills for electricity were the rule. Even with the addition of the instalment for appliances, the bill rendered twelve times a year does not become so awesome as when it is allowed to pile up for two or three months.

Perhaps the finest display of electric light fittings was that seen in the showroom of a Boston firm of jobbers (factors), and the following details may serve to indicate the enterprise shown by this branch of the industry. One floor of their new building was devoted exclusively to fittings of all periods. This flat cost £12,000 for partition walls, floor coverings, decorations, and wiring, and contains stock of value £12,000. I was assured by those in the trade that probably no better selection of high-class electric lighting fittings was to be seen in the United States, and I could readily believe this statement. I was shown a large insurance company's building having 3,000 of one type of high-class fitting throughout the offices, and practically lit throughout by "daylight" lamps.

Show Windows.

There were no notable features in electrical window displays—nothing in the contents that one might not see anywhere in Britain. Details of the show-windows of the Commonwealth Edison Co. (admittedly the finest electrical headquarters in the world) at the date of my visit are as follows:—

1.—Coffee percolators.
2.—Refrigerators.
3.—Ventilating fans.
4.—Ironing machines.
5.—Radio sets and accessories.
6.—Coffee percolators.
7.—Coffee percolators.
8.—Bowl fires—standard lamps.
9.—Washing machines.
10.—Standard lamps.

11 and 12.—Two windows devoted to printed notices offering company stock to the public. (Customer ownership is a feature of most central-station companies.)

Note.—Each of the twelve windows measures 14 ft. in width, and obviously there was no crowding of the merchandise. The display of table lamp standards and multi-coloured shades within these showrooms was probably the most outstanding feature. This company has a merchandising turnover (including branch showrooms) of over £1,000,000 per annum, and last year sold 48,000 electric irons—28,000 of these from the showrooms, 20,000 by outside salesmen, paid on commission at the rate of 5s. per iron sold.

That the management does not object to casual visitors to the showroom is evidenced by the fact that there is a constant stream of passenger traffic right through the centre of the showroom, virtually an alley connecting two main thoroughfares. Whether this arrangement was of necessity or choice was not made clear, but it certainly imparted an atmosphere of activity to the building.

The showrooms, always in close proximity to the head offices of the central station (if not in the actual building), were generally situated in main thoroughfares, and were of a design and size calculated to impress one with the magnitude of the undertaking.

Window Lighting.

Show windows in all trades were well lighted, generally until after midnight, and usually on Sunday evenings also. Our standard practice of 100-watt lamps spaced 12 in. apart is rapidly giving way to 200-watt lamps, and in some cases 500-watt lamps, at short intervals—"super-window-lighting" as it is called. To one accustomed to the conservative non-advertising of British banks it was amazing to note the adoption of illuminated signs, flood lighting, and other modern aids to business on bank buildings. These buildings were on a palatial scale, vastly superior to similar institutions in Britain. The lighting of posters and advertising hoardings was very general.

The electrical equipment in the larger hotels was on a very complete scale; *e.g.*, in a Chicago hotel, with 2,000 bedrooms, the elevator load alone amounted to over 1,000 kilowatts, and the annual consumption was in the region of 20,000,000 kilowatt-hours. When one remembers that there are over fifty hotels in Chicago, the largest containing over 3,000 bedrooms, one begins to understand in part how these marvellous kilowatt-hours per capita figures are arrived at. The lighting in hotel bedrooms is generous, as many as ten lighting points (ceiling fixtures, wall brackets, bedlight, bathroom, and lavatory lights) being available in many cases.

Heavy Cooking Apparatus.

In the areas visited one did not observe any general use of electrical cooking gear, either in restaurant or hotel kitchens, and although many undertakings are now endeavouring to foster this class of load, in this respect at least Great Britain is not behind. I had an opportunity of inspecting a large canteen, fully equipped electrically, including water heating, in the works of a well-known electrical manufacturer in the Chicago district. This was used as a trying-out ground for all types of cooking apparatus, and the firm in question is as a result of its first-hand experience doing a rapidly growing business in heavy-duty apparatus. It was gratifying, also, to notice that all enamelling and japanning in this factory was being done electrically, the annual payments to the central station for electricity being in the region of £12,000 per annum. In another works were seen electric enamelling ovens which had been at work twenty-four hours daily for over eighteen months, without element trouble of any kind.

Tariffs for Electricity Supply.

By Lieut.-Col. W. A. VIGNOLES, D.S.O., M.I.E.E., Electrical Engineer to the Corporation of Grimsby.

The search for the perfect tariff has ended with the discovery that there is no such thing; but the study of the question has shown that electricity supply, and more particularly the domestic uses of electricity, can be developed with tariffs that are at present in use in many towns. In other words, salesmanship is more important than tariffs.

Of the tariffs in use, by far the most successful, and the one that stands out as the most satisfactory from either the consumer's, or the undertaking's, point of view, is the straight-forward two-part tariff, consisting of a first charge, based directly, or indirectly, on the consumer's maximum demand, and a second small running charge per unit.

Admittedly, this will not make the consumer pay a sum exactly proportionate to the cost of supplying him. Some consumers will pay too much and some too little, but in any case it will be a great deal fairer than any flat rate, under which a consumer may pay several hundred per cent. too much or too little.

Lieut.-Col. W. A. Vignoles, D.S.O.

While the two-part tariff is fairer to the consumer, it helps the development of sales, as with such a tariff the consumer learns that he need not exercise the extreme economy in the use of light that he has done in the past, and that electricity for other purposes is not the expensive luxury he deemed it.

The two-part tariff has the advantage of simplicity; it can be understood by the consumer, and its equity appreciated, which is more than can be said of many electricity tariffs.

Of the many tariffs developed by engineers, some involve the use of a two-rate, or other special meter; such tariffs will not be generally adopted owing to the expense of the meter. Expenditure on meters is unproductive, and should be kept down to the bare minimum, *i.e.*, the provision of one standard meter only for each small consumer. The capital expenditure on distribution is large enough as it is; electricity supply cannot afford anything beyond the minimum indicated.

Early last year over 50 per cent. of the 260 towns reporting were using some form of two-part tariff, and no doubt the number has increased considerably since then. This is having its effect, and consumers who have had the benefit of the two-part tariff in one town, are asking when they move into another district if they can be charged on a similar basis. The movement of individuals from one district to another is probably increasing, and it is time that an effort was made to get more uniformity in tariffs throughout the country, so that propaganda in one district may not be without meaning in another.

But who will be plucky enough to call a conference to deal with the question, and be willing to preside over it? So many undertakings have their "pet" tariffs developed frequently because the question has been considered to be a scientific problem, whereas it is a strictly commercial matter and should be treated as such.

The fixing of the basis of the first charge of a two-part tariff is a detail, compared with the important matter of adopting the principle; it is, however, a detail that must be settled, and the writer thinks that undertakings adopting the two-part tariff for the first time would be well advised to base their first charge for houses on floor area, taking the ground floor only, but making an allowance in the case of bungalows with bedrooms on the ground level.

A basis of rateable value worked well on pre-war valuations, but difficulties arise with new houses, while with the larger areas now supplied by undertakings the basis of the assessment for rates frequently varies in different parts of the area. A basis of lamps connected is not recommended, as this tends to discourage the wiring of points for occasional use.

For business premises, shops, &c., the first charge, it would appear, can only be based on maximum demand, measured or estimated. Personally, the writer is entirely in favour of working on the estimated maximum demand created by the consumer as settled by a survey. Under this system the consumer is required to sign an undertaking not to increase his lights beyond the number and power shown on the survey sheet, without permission of the undertaking. This arrangement works well, and no serious difficulty is experienced in revising the survey and first charge, when the consumer adds to the number of his lights.

It should be noted that the charge should be based on the consumer's maximum demand even if this occurs after the usual peak on the works, as in the case of theatres.

It must not be thought that a two-part, or any other, tariff is all that is required to sell electricity and to develop the supply; on the contrary, a favourable tariff should be the signal for redoubled efforts by the sales department, and good selling combined with a low rate of any kind for heating, cooking, &c., may cause a considerable development of the domestic load.

This is brought out by the following table referring to seven towns taken at random. Here the order of place has been determined by the figure obtained by dividing the population of the area by the number of consumers. This should be a fair guide to the electrification of the area from the domestic point of view; the figures in the fourth column, units sold for lighting, heating, and cooking per head of population, are also of interest.

Town.	Population divided by number of consumers.	Total units sold per head.	Units sold for lighting, heating and cooking per head.	Units sold per £ capital expended on distribution.	Date of introduction of two part tariff.
Norwich	8·7	168	75	57	1907
Bedford	10·8	194	50	70	None
Burton	15	320	48	65	None
Sheffield	16·5	306	50	81	1913
Chester	17	81	45	24	1911
Grimsby	17	129	36	77	1922
Lincoln	32	260	28	155	None*

(*Large supply to one consumer.)

It cannot be an accident that Norwich, the town where the rateable-value system originated in 1907, heads the

list in both columns, the sales per head in column four being 50 per cent. more than in any other town. Column five shows the units sold per £ capital expended on distribution, a figure suggested by Mr. J. M. Kennedy in his recent British Association paper.

As regards the next two towns, Bedford is perhaps particularly well situated, owing to the large proportion of professional residents, but Burton has no such advantage, and the position of this town is probably due to the particularly active sales department; both towns have been selling electricity for heating and cooking at 1d. to 1½d. per unit.

Conditions vary in every town; thus, while Bedford has a very large middle-class population, Grimsby has a seafaring population, with few factories, and a small number of middle-class families. But allowing for such variations the table will, it is thought, show that great development of electricity can be obtained by working on simple existing tariffs, and that the highest development has been obtained by the use of the rateable-value system.

It is to be hoped that engineers will consider this question of tariffs as settled. Discussion only encourages the production of new tariffs (which is very undesirable) and discourages the development of the selling side of an undertaking. No salesman can get on with his job while it is undecided what form the tariff should take, and as it is years before the full effect of a change in tariff can be felt, it is very desirable that undertakings should settle their policy so that their sales engineers may proceed in peace with their work.

Wiring Small Houses.

By W. ELLERD-STYLES, M.I.E.E.,
Member of the Electrical Contractors' Association.

We answer the call of the E.D.A. to "Wire the Homes of Britain" conscious of several handicaps. It seems almost incredible that the I.E.E. Regulations for the Electrical Equipment of Buildings are not compulsory. They are the outcome of investigations by energetic men, and appear as modifications of rules framed at frequent periods dating back to a year before many of us were expected to appear on this planet.

Although several of us have nurtured the scheme for years, and now are able to proudly claim to be registered electrical contractors, we strongly feel that lack of compulsion weakens our efforts.

How much happier we should feel, and how much better would the work be performed, if the high standard formulated by the I.E.E. Regulations were maintained, and only registered contractors were permitted to do the "Wiring of the Homes of Britain." Is it too late for the E.D.A. to ventilate this in its nation-wide propaganda?

Why not the slogan:—"Only the Registered Electrical Contractor can give you expert electrical serice"?

However, we must get after the business, and now come further queries. What system of wiring shall we employ? Do we make the best of the installation? To the latter question we say empha tically NO! To the former we must frame an answer more discreet.

The whims of the local electricity supply authority have a bearing on the choice of the wiring system, and also affect the ease or otherwise with which we can submit an attractive estimate and specification to the "prospect." The false opinion that only supply authorities are skilled and capable of giving the best service must be first of all removed. In fact, it is often the contrary, and the registered electrical contractor can easily teach many things to the staffs of supply authorities. We therefore need the spirit of mutual confidence to be created between these two (often opposing) factors.

Without appearing to discriminate, let us hope that other supply authorities will follow the lead of the Manchester Corporation electricity department, which only allows approved contractors to carry out installations, and at the same time renders assistance. Its recent issue of booklets—one comprising "Regulations for the Electrical Equipment of Buildings," and the other "Conditions of Supply of Electrical Energy"—is commendable.

Then the question of tariffs has to be considered, and these are as various as the voltages, frequencies, &c. Suppose we assume that the domestic tariff now adopted by several progressive supply authorities is a good one: we only have one meter to consider, and we can plan out the wiring so that lighting and domestic appliances, excluding any of the latter requiring more than five amperes, can be connected in identical circuits. For the larger radiators, &c., we shall, of course, run separate circuits, but this can be carried out inexpensively.

Reg. Haines] [*London.*

Mr. W. Ellerd-Styles.

In numerous instances we shall have to enter the house which has stood for many years, possessing decorations that must not be disfigured. To gain the confidence of the occupier it will be essential to promise little or no disturbance. In such situations we cannot send along hundreds of feet of conduit—the system must be flexible; but we must not forget provision for the earthing of domestic appliances. We must conceal as much as possible, which is not very difficult when we have a knowledge of building construction. Even the solid brick walls need not involve surface wiring, provided a little care is bestowed on the work. Wiring under the floors should not entail disturbance of the furniture.

It pays, however, to plan out the runs on paper before commencing the job. Considerable economies can be effected by the judicious use of three-plate ceiling roses and, where special fittings are required, by employing fixture blocks having porcelain two-circuit interiors. These will obviate using joint boxes, and prevent the pernicious habit of making soldered joints. They enable "looping-in" to be satisfactorily carried out, but at the same time eliminate long runs.

The choice of wiring is reduced to two alternatives: metal-sheathed, and tough-rubber-compound-covered cables—the latter being camouflage for the well-known "c.t.s." Obviously, it is difficult to advise in this final selection without appearing biased, so the subject must be dealt with judiciously. We know that with metal-sheathed cables it is specified that they must be efficiently earthed, or "grounded" as the Americans say. They must be made electrically continuous by soldering or by using bonding clamps. The electrical resistance in a complete installation must not exceed 2 ohms on the sheathing measured between a point near the main switch and any other point of the installation. This is all understood by the genuine contractor, but what of the other type of contractor? We wonder how many installations will fulfil this test. We certainly know of many installations which are metal-sheathed and entirely without bonding, and no part of the system is earthed.

Certainly the question arises: How can this test be made with a metal-sheathed installation with all wiring concealed, and all switches, fittings, &c., in position? By inspection and testing during erection, is the answer.

We are reminded that with metal-sheathed cables provision must be made to secure the cable by means of clips, saddles, or clamps at frequent intervals. They should be spaced to prevent appreciable sagging of the cable, and must be constructed of a material not liable to set up electrolytic action with the sheathing. Of course, with concealed wiring very few supports are necessary. Care must be taken when the cable passes over timbers for drop points, as a sharp edge may kink the sheathing and lead to trouble. Remember that when there is a change of direction from horizontal to vertical, cables are to be brought over a rounded support of a radius not less than six times the external diameter of the sheathing.

It is still questionable whether metal-sheathed cables can be buried in plaster. It is done repeatedly and can be done, but a facing of neat cement is preferable to plaster, as the former is proof against nails.

In comparison with c.t.s., there is a little difference in the method of making the runs, although greater caution is necessary to prevent kinking of the metal sheathing.

It is possible to sum up the advantages of c.t.s. in a few words. Bonding and earthing of sheathing, as well as the question of electrolysis at the supports, are absent factors. Kinking can be ignored. It can be buried in plaster and faced with neat cement, when it will give no trouble. The two-ohm test can be forgotten. Consequently, it is the easiest and quickest of systems to install. Always arrange that the sheathing is brought well into the fixture blocks, &c. We must not forget the question of cost, and under this heading, taking the solid-drawn, screwed-conduit installation as 100 per cent., we can figure on 75 per cent. to 80 per cent. for metal-sheathed wiring, and 45 per cent. to 50 per cent. for c.t.s., assuming the conditions equal in each instance. We refrain from giving actual prices, for obvious reasons.

Frequently we find a surface run where concealment would be easy. With a papered wall it is a matter of making a clean cut in the paper where the run is necessary. The paper can be lifted with a thin palette knife and folded back, exposing the plaster. A channel is then chased until the bricks are exposed. The cable is fixed to the bricks, and the channel filled with neat cement. Allow it to dry out, paint over the cement with liquid size, and when it is dry the paper can be pasted down, leaving no trace of the disturbance.

When runs are made under floors it is best, where joists have to be crossed, to bore holes with a ratchet brace and bit about 3 in. from the top of the joist, and thread the cables through. This assures protection against nails through the floor boards when the latter are relaid. It is not necessary to enlarge further on these matters, otherwise we shall be accused of trying to teach the contractor his business.

We are safe in stating that contractors neglect to take full advantage of switch controls. This is where the gas-lighting advocate is left yawning.

The admirable collection of propaganda literature recently distributed by the E.D.A. contains reference to the control of staircase lighting from two or three points by the use of two-way and intermediate switches. If this is a distinctive feature, why not take full advantage of switch controls? Certainly we have to look in one direction for an enterprising firm which has developed control switching to a fine art; but this is no restraint, the demand would create competition amongst manufacturers, to the contractors' advantage.

Examine the rooms illustrated in the E.D.A. Ballot Booklet. What an opportunity for improved switching. What an excellent competition to offer! Here is an opportunity to get away from the old-fashioned single-pole tumbler switch, and to demonstrate effective economies of current. How many think of using series-parallel control for dim lighting? When have you seen two-way-and-off switches for controlling radiator points? Demonstrate to your client how he can have the latter switch in his bedroom, and be sure that the radiator in the adjoining bedroom is not left in circuit. After all, to heat the bedroom only needs a couple of hours, and when a comfortable temperature is obtained, he just switches over to the second radiator. When necessary, both points can be switched off. This effects economies in wiring besides centralising controls. Lest we be misunderstood—we do not wish to convey the idea that tumbler switches should not be used; on the contrary, we advocate their use. It is the *universal* use of single-pole switches which should be discouraged. They are mainly for the amateur, and not the present-day progressive registered electrical contractor.

Reverting to the wiring proposition, reference has only been made to occupied premises. On the other side we have the premises still in the builder's hands. The question of runs becomes a simple matter provided that we are on the job in good time. Yet, how much easier would the installation become if the architect would assist us by making cavity partition walls giving clear access from floor to floor, from the ground level to the top of the uppermost ceiling. It is a simple matter to arrange, and would cheapen the cost of wiring to an appreciable extent. This facility might then permit of the planning of the job in the workshop, and standard sets of cables, &c., being sent for rigging-up on the premises to be wired.

By judicious planning plug points can be economically installed, these being infinitely better than looking for improved lamp-holders. Only recently we were called to investigate the cause of fuses blowing mysteriously, and tests proved the wiring to be "O.K." Lamps were taken out and the filaments found to be intact. Ultimately, the trouble was traced to a lamp, the bulb of which turned slightly in the cap, probably having been wrenched in being continually removed and replaced when the electric iron was required. The twist caused a "short" above the filament in the bulb. Incidentally, this short did not take place every time the lamp was handled, hence the difficulty of locating the fault. Certainly, it is better to arrange for the least possible handling of the lamps. It is so much easier to insert a plug, when sockets are conveniently placed.

When installing radiator points, remember that the position of the existing fireplace is not always the situation to place the radiator in for obtaining the best heating effect in the room. Invariably, the most efficient results are obtained by placing two or more small radiators about the room in preference to one large radiator.

In conclusion, we express sympathy with the contractors who are in those unfortunate areas with rates from 10d. to 18d. per unit. How can they conscientiously hope to "Wire the Homes of Britain" and point to the economies obtained with electric domestic appliances?

The Campaign Scheme Discussed.—Very appropriately the subject chosen for the inaugural conference of the E.D.A. series (1926-27), on Friday last, was "Wiring the Homes of Britain." Mr. V. W. Dale, business manager of the British Electrical Development Association, opened the discussion.

Further Experience with an Electric Washer.

By "WREN."

Just over a year ago, in the September 4th, 1925, issue of the Electrical Review to be precise, the writer gave his experiences, and those of his wife, in "Choosing and Using an Electric Washer." Since then, the washer has been in regular service and, up to the time of preparing these notes, it has dealt with about 60 washes in 20 months. During that period the only outlay on the machine has been about 2d. for lubricating oil and 23s. 6d. for attention to the brushes of the motor. Of this last item, only 6d. was properly chargeable to the washer, as will presently appear.

Performance.

Our general opinion of the machine remains unaltered—it does its work and does it well, it is simple and economical, and it pays a handsome dividend on its initial cost. Just how much it has saved cannot be determined accurately, for, the machine having been bought to save labour and trouble, we do not feel inclined to embark upon the book-keeping necessary to compare the cost of each wash at home with what it would be if sent to the laundry. For the purposes of this article, however, the following particulars were noted concerning the heavy wash which followed a holiday by the sea. In explanation of the curious composition of the wash, it should be noted that some articles had been sent to the seaside laundry as a matter of convenience. Incidentally, these can now be identified with the greatest of ease by their different (and less satisfactory) colour.

The articles dealt with, in nine successive "loads" of the washing drum, were as follows:—

	Running time.
(1) Tablecloth, 3 shirts, 6 table napkins, 2 camisoles, 2 nightdress cases, 1 nightdress, 1 tunic, 27 handkerchiefs	20 mins.
(2) 2 sheets, 3 pillowcases, 1 bath towel, 3 face gloves, 2 pairs knickers	15 mins.
(3) 1 white sweater, 1 pair flannel trousers, 1 serge skirt, 1 woollen vest, 2 pairs flannel knickers, 2 pairs white socks	10 mins.
(4) 1 pair pyjamas, 2 nightdresses, 2 small blankets, 1 pair pants, 1 vest	10 mins.
(5) 2 cotton suits, 2 dresses, 2 pairs knickers, 1 jumper, 1 overall	20 mins.
(6) 6 brown Turkish towels (saturated with brine)	15 mins.
(7) 4 bathing costumes	5 mins.
(8) 1 bathing wrap (heavy and saturated with brine)	10 mins.
(9) 8 pairs stockings	10 mins.
Total	1 hr. 55 mins.

Including loading, emptying, wringing, rinsing and hanging out, this wash occupied 3¼ hours, during which time there were the usual interruptions occasioned by young children, tradesmen, and so forth. The wash itself, a heavy one but by no means the heaviest accomplished, was completed by noon, starting immediately after breakfast.

Taking the prices of the laundry to which the clothes would have gone, had they been sent out, the bill for this wash would have been 27s. 10d. The actual costs were as follows:—

Energy for washing machine 0.38 kWh at 7d. (running from light socket) = 2.66d., say	2¾d.
Soap	11½d.
Starch	2d.
Coal*, say	2½d.
Energy for electric iron 3 hours at 400 W = 1.2 kWh at 2d. (power rate), say	2½d.
Total	1s. 9d.

* The hot water was provided by a boiler burning 15 lb. of anthracite in 24 hr., costing 6.85d., at 85s. per ton. This boiler supplied water for all purposes, including three baths; certainly less than one-third of the total amount of water was used for the laundry work.

The cash saving on this particular wash was thus 26s. 1d., and the clothes were unquestionably of better colour and subjected to much less damage than they would have been had they gone to the laundry. This saving represents a return of 2.6 per cent. (*per wash*) on the first cost (£50) of the machine, so that the latter has already more than paid for itself during its 20 months of service—and it is, so far as one can tell, still as good as new.

Criticisms and Suggestions.

This is the most difficult part of the article to write, for, in all essentials, we have nothing but praise for the machine. The only "serious" trouble experienced—which actually involved the postponement of a wash-day—arose in this manner: The motor suddenly began to run unsteadily, and considerable sparking was evident on lifting the side cover. Clearly, the brushes needed attention. It was found that these were of the type which slip down a tubular holder, pressure being applied by a light spiral spring compressed between the end of the brush and the cover cap. The old brushes being worn short, a new pair was ordered at a cost of 6d. They arrived, and the writer, surrounded by an admiring family, proceeded to put them in place. Unfortunately, one of the new brushes was either oversize or slightly warped, for, having disappeared down the holder tube, it then resolutely refused either to go forward or to return. At this stage the writer retired, having no leisure for the extensive operation evidently required to exhume the hapless brush. A representative of the firm responsible for the motor was duly summoned, and he, with his mate, toiled for close upon two hours, it being necessary to dismantle the drive and shift the motor before the end cover could be removed to get at the brushes. It was no fault of the washing machine that caused an imperfect brush to jam, but a little more care might have been devoted by the designers to making the motor more easily accessible for such relatively small adjustments. The bill for this incident amounted to 23s. 6d. and, even if it be charged fully against the washer, which seems hardly fair, it is not an excessive amount for the 18 months' service rendered before it was incurred.

The gear boxes of the machine were ready-packed with grease when the washer was purchased and, so far as can be seen, the lubrication is still ample. Unfortunately, the inspection covers are very small, so that it is not easy to see just how much grease remains. This is a point which designers may care to bear in mind. At the same time, they may be able to ensure that there is no dripping of oil or melted grease from the bearings on to the floor; as some leakage is inevitable, drip pans should be provided. The writer's machine stands on a tiled floor, whence a little oil and grease is easily removed, but with other flooring materials the cumulative effect of such leakage might be objectionable. Very little trouble is experienced in lubricating those bearings which require oil; indeed, the only difficulty lies in getting at the bearings of the wringer without soiling the rollers, and this difficulty could be overcome by providing holes in the wringer frame at suitable positions.

The washing cylinder itself has gradually become coated in places with a white deposit which goes to powder when scraped with the thumb-nail; it could easily be removed, but, as it seems to be quite harmless, it is left alone. The trouble experienced at first, from mould growing on the wooden parts of the cylinder, has been eliminated by allowing the latter to dry (preferably out of doors) before the machine is closed.

Such are the only troubles which have been experienced and, obviously, they are all of a very minor nature. The machine is almost silent in operation, but if it happens to be running during broadcasting hours, the commutation of the motor can be heard, like the rattling of peas, during the intervals in the B.B.C. programme.

A Selling Campaign Needed.

Though there are signs of increasing efforts to sell electric washing machines, there is still room for improvement. The writer's machine has been demonstrated to many friends, and has roused much interest and not a little envy. The first cost of the machine, no doubt, puts it beyond the reach of many families, but if the problem were taken up in real earnest, it is evident that the price could be reduced quite materially and the ubiquitous hire-purchase system could be applied successfully.

The truth of the matter seems to be that neither manufacturers nor central stations are really "pushing" electric washers—certainly not with one-tenth the energy that is being devoted to the sale of vacuum cleaners. The difference between the numbers of electric washers and vacuum cleaners in use is out of all proportion to the difference in cost of the two machines.

The difficulties experienced by the writer in obtaining satisfactory information regarding washers were described in the earlier article already mentioned. A year later, one of our visitors, seeing our machine, decided to go and do likewise. The lady in question lives in a flourishing industrial district in the Midlands, but the people in charge of the local electricity supply office had little knowledge of electric washers, and apparently no interest in the subject. They were ultimately persuaded to obtain for their customer a machine of the same make as the writer's, and the results have been equally satisfactory to the user, who says she regards the machine as "her best investment."

The writer's previous article brought inquiries from as far away as New Zealand, and his machine has definitely interested many friends; one has purchased a machine already and others will doubtless follow suit as opportunity arises. The electric washer is undoubtedly a sound investment, well worth buying—and well worth selling, for it is a real "business getter" in the field of domestic electrical appliances.

Internal Communications.

A Survey of Weak-Current Apparatus for Domestic and Industrial Use.

By HERBERT G. WHITE., A.M.I.E.E.

The subject of internal communications does not as a rule receive the same attention at the hands of the architect or consulting engineer as do the possibly more important features of lighting, heating and cooking. Yet an efficient, smoothly working system of electric bells, telephones, and fire or burglary alarms adds much to the comfort, security, and well-being of the house and its inmates, and, indeed, is an essential part of any large mansion, hotel, or public institution. The time has, happily, passed when this type of installation was deemed perhaps a necessary evil, to be arranged and installed in a haphazard, indifferent manner, regardless of the rules of good insulation, careful design, and up-to-date practice.

Internal Telephones.

While it is true that in a large business house, or a hotel, the intercommunicating telephone has been almost completely replaced by private branch exchanges installed and maintained by the Post Office, there are still many opportunities for the enterprising contractor who cares to acquaint himself with the developments in the design of small automatic exchanges, and the more reliable and simplified types of central-battery intercommunicating telephone systems. These have the great advantage of privacy of conversation, and in a large business house this is of considerable importance, preventing the leakage of information among the staff. The maintenance contracts of these installations form a very useful source of income to the contractor, who thereby keeps himself in touch with his client, and is able to find work for his men at odd times between his larger contracts. The suggestion of maintenance contracts does not imply that such installations are in constant need of repair, but with any piece of apparatus such as a telephone in constant use, it is always advisable to have periodic overhauls for the purpose of adjustment, recharging batteries, and the like. These are always done better and with more intelligence by the original installers, than by a third and perhaps less interested party. The possibility of alterations and extensions, moreover, should not be overlooked.

Electric Bells and Indicators.

The possibilities in the domain of the humble but useful electric bell are many and varied. Where current is laid on, either a.c. or d.c., there is no need to be dependent upon the wet or dry cell, with all its faults and failings, as a source of current. Provided that the wiring is carried out with due regard to the insulation necessary for the higher voltage, there is no reason why the house supply should not be used to actuate even the simple front-door bell, and for larger installations, the availability of the house supply simplifies many of the problems of long runs, parallel circuits and kindred difficulties. Naturally, the cost of the specially-wound bells and the labour and material charges are greater, but the cost of maintenance is reduced to almost nothing, and the increased efficiency and reliability of the installation fully compensate for the extra initial cost.

For hospital and hotel work the multiple-indicator system naturally is a necessity, but here again the lighting supply can be used with advantage; but, in this case the use of direct current is preferable, especially when pendulum or electrical replacement indicators are used, as these types do not work well on alternating current. Mechanical replacement indicators, however, are quite reliable on such a circuit. The electrical replacement indicator might with advantage be used more than it is because the present-day designs are much more reliable than the older polarised type, which was never really satisfactory, although many old installations in hotels are still giving good service. The new non-polarised electrical replacement indicators are much more labour-saving to the hotel staff than the pendulum or mechanical types, because in the multiple or duplicate indicator systems, the problem of distant replacement is easily solved. In the present-day large hotel they are virtually a necessity. By their use the work of the staff is considerably lightened, and the service is in consequence correspondingly improved. Sectional and control indicators, moreover, enable the supervisory staff to maintain a much better control over the floor staffs.

Fire Alarms.

The same principle of duplicate indicators can, of course, be applied to fire alarms, which are really a necessity in any large building, whether mansion, hospital, hotel, or public institution. Much of the damage caused by recent country-house fires could have been prevented if an efficient fire-alarm system, with an extension to the nearest fire station, had been installed. The cost of renting from the Post Office an overhead line for the extension is not excessive in view of the risk involved by the absence of direct communication, and the great amount of time saved, even where telephonic communication is available. Alternatively, the provision of a motor-driven siren on the roof of the house is another means of arousing the neighbourhood, which in outlying districts is often the sole source of assistance in such circumstances.

The use of heat-operated fire-alarm contacts is not as prevalent as it might be, when the choice of several quite reliable devices of this kind is to be had. Although the majority of these devices are usually installed by specialists, there is no reason why the contractor should not avail himself of their co-operation. This is a field which might profitably be explored by the enterprising contractor.

Burglary Alarms.

Under this heading we may dismiss as inefficient any system which does not work on the closed-circuit principle, which system, when properly designed and installed with due regard to immunity from inside interference, may be rendered an almost perfect safeguard against forcible entry. The moving aside of a blind, opening a window, or even cutting a pane of glass, may be made to give the alarm, and the circuit once opened can be made to operate, by means of suitable relays, any number or volume of sound-producing devices. The mere approach of an intruder towards a safe door can be made to give the alarm, and such devices are easy to install; beyond periodical testing, which is absolutely necessary in any such system, they require very little maintenance. A point to be remembered is that where an efficient system of fire or burglary alarms is fitted, many insurance companies make substantial reductions in their premiums on these risks.

Factory and Staff Signals.

On this subject much could be written, but space does not permit of an exhaustive description of the various systems which the contractor may be called upon to install. It is sufficient to say that there is hardly a factory or large business house that would not benefit by the installation of an efficient means of promptly locating the heads of departments, should they be absent from the office or desk. The amount of time lost in locating, for instance, a works manager who is going his rounds from one shop to another can be entirely saved by a system of bells, coloured lights, or other audible and visible signals, which, when operated, will instantly inform the wanted person that he is being sought, and it is then an easy matter for him to go to the nearest telephone to inquire who is seeking him. A large number of combinations of coloured lamps can be arranged, each denoting a different person or message with a very few lamps and fewer wires. The lighting supply can be used to furnish the current in almost every instance, thus obviating the expensive upkeep of a large primary battery.

Apart from purely staff calls, an installation of time signals, operated by push-button or automatically, is nowadays a necessity in any well-equipped works. Not only can a system of bells be rung in all departments, but by means of suitable relays the signals can be made to operate a steam whistle or a motor-driven siren, when it is necessary or advisable that the sound should be heard over a large area.

Such systems are becoming increasingly popular both with employers and workers, as a system for accurately and fairly indicating the start and cease-work times is beneficial to both parties.

Electric Clocks.

A general survey of the subject of internal communications would be incomplete without some reference to electric clocks. These are quite within the scope of the contractor, although he is too often content to leave their installation to the manufacturer. This is to be regretted, because an electric clock is just as much a piece of electrical apparatus as a motor or an electric vacuum cleaner. The installation is extremely simple, no knowledge of clockwork is required, and the apparatus is accurate and reliable. Provided that ordinary care is taken with the wiring, and the master clock is correctly and firmly fixed to its support, the only part of the installation that needs attention is the battery. It is not advisable to use the lighting supply as the source of current for electric clocks unless an uninterrupted supply, night and day, can be assured.

There is undoubtedly a large future for the electric clock, and contractors would do well to cultivate its acquaintance. In hotels, factories, and public institutions the value of accurate and universal time is often of paramount importance, while for large houses and country mansions there is much to be said in favour of their inclusion in the consulting engineers' or architects' specifications.

The Installation of Broadcast Receivers.

By PAUL D. TYERS.

It has recently been pointed out in the Electrical Review that the wireless trade is being forced more and more into the hands of the ordinary electrical contractor and dealer, and, accordingly, private wireless installations should now be treated with as much care as other branches of electrical engineering. In the early day of broadcasting, wireless sets were rather crude, and their installation in a private house was of a somewhat temporary nature. To-day, however, the electrical dealer is called upon to install a receiver, batteries, and battery chargers, and to wire-up loud-speaker extensions. Although the general principles of electrical wiring can be followed fairly closely, there are certain respects in which wireless installations differ very materially from bell, telephone, or lighting circuits, and accordingly it will be well to consider the most important points which must be borne in mind.

Although the actual position of a wireless set in a private house is largely controlled by the whims and fancies of the owner, it is really most important that the set should be placed directly at the end of the down-lead, that is, at the point at which it enters the room. It is definitely and fundamentally incorrect to connect a receiver to a lead-in which has been taken round walls or through two or three rooms, and yet the writer has examined literally dozens of leads-in of this nature. The loss in efficiency is tremendous. The conditions are somewhat similar, although to a less extent, with the earth lead, and when first installing a receiver, every endeavour should be made to place it near a window, where the down-lead and earth lead are of the shortest possible length. The most important points regarding aerial and earth installation have previously been considered by the writer in these columns, and accordingly these matters will not be dealt with here.

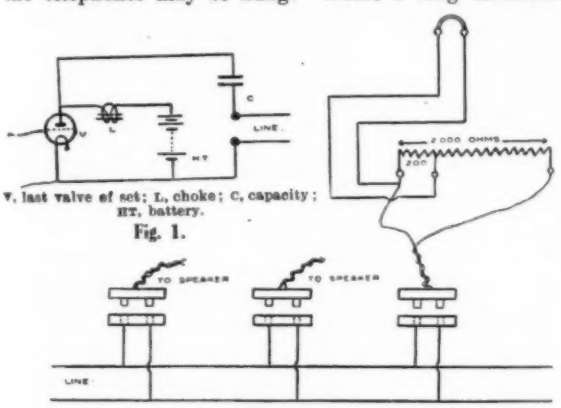
The Disposal of Batteries.

One of the first problems which arises in the installation of a receiver is that of the disposal of the batteries in the most convenient place. Although some receivers are built into a cabinet provided with a partition for housing both the high-tension batteries and the accumulators, this is not general, and one finds that the batteries are usually strewn about the floor or the table in a somewhat promiscuous manner. The high-tension batteries should not be exposed either to heat or damp, and the same applies in a limited sense to the accumulators; undoubtedly the best procedure is to put both the high-tension batteries and the accumulators in a box, which can be placed at some small distance from the set on the floor, where it is not in the way, a multiple cable being provided between the set and the batteries. Excellent multiple cables can now be obtained for a matter of some two or three shillings.

and their use is vastly preferable to that of a number of separate wires, which are apt to become disconnected, or entangled with fittings and fixtures which may be in their vicinity. The battery box should be so made that easy access to the accumulator is obtainable, as this has to be removed at intervals for charging purposes. The leads in the multiple cable to the high-tension battery should be permanently connected, as in the majority of cases it is not necessary to vary the high-tension voltage while the set is being used. The filament battery leads, however, should be provided with a pair of spade terminals well coated with vaseline, which can be quickly slipped under the type of terminal which is used on the accumulator.

Loud-Speaker Extensions.

The desirability of placing the set directly at the end of the short down-lead has been pointed out, but following this procedure may result in the set being in a room other than that in which it is desired to listen, or perhaps at the wrong end of the room. This is of no real importance, since an extension to the loud speaker or telephones may be made without the slightest loss in efficiency. Where an extension to the telephones from a small set is only a matter of a yard or two, ordinary electric lighting flex may be employed, the flex being soldered or joined by some form of connector to the telephone tags, and the joint taped over. A small hook can then be placed in any convenient position on which the telephones may be hung. Where a long extension



V, last valve of set; L, choke; C, capacity; H.T., battery.

Fig. 1.

Fig. 2.

is required, wires have to be run from the telephone terminals of the set, and provided with sockets at intervals in which the telephones or loud speaker may be plugged. It must be remembered that one side of the telephones or loud speaker is connected to the positive terminals of the high-tension battery, which, in a multi-valve set, may have a pressure of from 100 to 200 volts, and it will therefore be necessary to treat the extension with as much care as an ordinary lighting circuit. In fact, even greater precautions will have to be taken, since a very high insulation resistance is necessary.

In actual practice, however, the extension should never be directly connected in the anode circuit of the last valve. Either a transformer or a choke and condenser should be employed, as shown in the accompanying illustration, fig. 1. The choke would not be less than 5 henries, and the condenser not less than $\frac{1}{2}$ microfarad. Since the extension is, then, not connected with the high-tension battery or the anode of the last valve, the line as a whole is substantially at earth potential, and accordingly the insulation need not be very high. For short extensions, light flex fixed along picture rails with insulated staples can be conveniently employed, but in wiring a new house the extension is, perhaps, best made with lead-covered twin telephone wire. This naturally introduces a slight increase of capacity across the loud speaker, which, if it becomes excessive, is apt to be detrimental, as it lowers the tone, since the capacity tends to by-pass a proportion of the higher frequencies. When an extremely long extension is required, it is preferable to run a single wire, and to make the return direct to earth, connections at various points being provided where required. This system of extension, of course, substantially eliminates all capacity between the two lines. The loud-speaker or telephone points are best taken off the lines by looping-in to 3- or 5-amp. lighting sockets.

A Composite Circuit.

Where it is desired to feed a number of speakers and telephone receivers from one line (the term "line" is here used to indicate a pair of wires, as in telephone work), a slight modification is necessary. If the telephones and the speaker were connected in parallel, the potential difference across the line would over-energise the telephones, making the speech and music partly un-

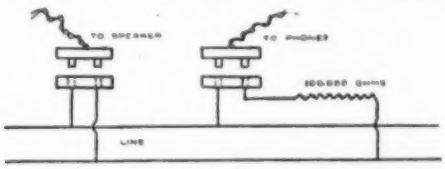
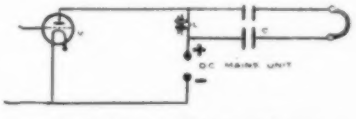


Fig. 3.

intelligible, and, at the same time, far too loud. It is necessary, therefore, to tap the telephones across part of a resistance connected across the line. For example, if three speakers, having a direct-current resistance of 2,000 ohms, were used in parallel on the line, the telephone leads might be tapped across about 100 to 200 ohms of a 2,000-ohm resistance (fig. 2). An alternative arrangement, which is indicated in fig. 3, consists in connecting the telephones across the line in series with a resistance of the order of 100,000 ohms. This, however, is not to be recommended, since it alters the tone of the speech and music very considerably. When a large number of speakers and telephones have to be used on a line, the line should be fed through an output transformer, the impedance of the secondary of which is substantially equal to the impedance of the line as a whole, when all the speakers and telephones are in use. The impedance of the primary is suited to that of the valve which is used as the last amplifier.

Power Supply.

In the early days of broadcast reception practically all listeners derived their power supply from small high-tension batteries, which were thrown away when exhausted, and filament accumulators, which were taken to the local electrical dealer when recharging was necessary. Nowadays, however, many listeners have installed home charging plants. Although these are usually sold as simple instruments for plugging into the nearest lamp socket, or wall plug, the electrical dealer would do well to point out one or two of the



V, last valve; L, choke; C, condensers.

Fig. 4.—Safety Device Isolating 'Phones from d.c. Mains.

fundamental points regarding shock and fire risks, and also suggest a suitable place in which the charger might be installed. Of course, the dealer should guard against alarming his client and giving him the impression that there is some real danger attached to the use of a charger at home. Points to bear in mind are:—(1) Celluloid accumulators should not be charged in the immediate vicinity of a naked light. (2) Care should be taken to prevent any corrosive acid spray from coming into contact with metal, and not to allow cells to be charged under a table, for example, at which the user might be constantly sitting. (3) It is necessary, particularly in the case of a d.c. charger, to place the cells on a glass or rubber mat while being charged, in order to guard against any leakage to earth. (4) The connection to the d.c. charger should be made so

that the accumulator is not at a high potential with respect to earth. (5) The cells should be disconnected from the set (*i.e.*, earth connection) before connection to the charger.

Mains Units.

Mains units for deriving the high-tension supply are now being adopted very largely, and greater care is required perhaps with these than with the chargers. In the case of a d.c. mains unit, the mains are connected directly to the receiving system. Most d.c. units are provided with a series condenser to isolate the earth connection from the set, which guards against any accidental short circuit. It must be remembered, however, that should a pair of telephone receivers be used directly in the anode circuit of one of the valves, and should the windings of the telephones go to earth on the frame of the head bands, the listener would be connected, indirectly perhaps, to a 240-volt main, and should he at the same time place his hand on an earthed body he might sustain a very severe shock. To guard against this possibility the telephones should always be connected through a transformer, or through a choke and condenser, as indicated in fig. 4. It is also highly advisable to fit an exceedingly light fuse in the lead to the mains unit, which, of course, is simply a filter consisting of a network of chokes and condensers. For this purpose it is found convenient to fix a bayonet-type lampholder wired in series with a fuse and switch, to which the mains unit can be connected with an ordinary adaptor. It is important to use lamp sockets for power supply, and three- or five-ampere two-pin sockets for telephone extensions, in order that there may not be confusion between the extension line and the power supply.

In the case of an a.c. high-tension supply unit, the shock risk is not so great, since there is no direct connection with the mains, the supply being taken, of course, through the anode-filament space of the valve. If a shock were obtained from the frame of the telephones it would necessitate a simultaneous breakdown of the telephone windings and the transformer in the mains unit. The a.c. mains unit should again be connected to the supply through a very light fuse. There is very little fire risk with a.c. units, and practically no greater risk with the d.c. type, but the writer prefers the use of units in metal cases, which give the user a feeling of greater security. There are now one or two units on the market which supply both filament and high-tension current, and these, it is believed, are adequately protected.

Electric Fires for the Home.

Some New Developments and Designs.

The manufacturers of electric fires offer a bewildering choice to the householder who contemplates the use of the most efficient and hygienic form of heating. The differences between electric fires are usually merely in design, *i.e.*, in the framework of the fires, and not in the actual heat-producing elements. A great deal more space than we have at our disposal would be required to deal adequately with the subject; we must be content, therefore, to mention a few of the more recent developments in the electric heating art.

The majority of the fires produced by Carron Company, while not unattractive, are obviously meant for service, and the purchaser does not pay more for decoration than for heating. Among the company's new models is the "No. 229," illustrated in fig. 1. This has two separately-switched 1,000-W firebars; it is 14½ in. wide and 20½ in. high, weighing 21¼ lb. Four finishes are available, *viz.*, art black, armour bright, porcelain-enamelled, and electro-bronze. Another new type, "No. 256" (fig. 2), is a trifle smaller than the first, weighing 17½ lb. In this case, although two bars of 1,000 W each are again employed, the spirals are horizontal and the formers are slightly convex, giving a wider distribution of the heat. The fire can be obtained in any one of the four finishes before-mentioned.

The "Heatrae Columbine" fire (fig. 3), made by Electric Fires, Ltd., possesses several novel features. In the first place, it can be supplied without a back, being designed to fit into an existing fireplace. Then the heating elements which do the real work (although imitation coal goes a long way with most people) are arranged vertically at the sides of the fire, instead of being fitted, as is usual, beneath the "coals." The fire-bars (1,000 W each) are of the company's plug-in type. The fire is framed in satin-black steel or polished antique brass. The same firm's "Ptolomy" fire (fig. 4) is a twin appliance, consisting of two standard plug-in 1,000-W fire bars, each with its own hammered brass reflector. The weight is only 12 lb., and the fire has a satin black steel frame.

The "H.1450" fire (fig. 6), which is being sold by the Siemens & English Electric Lamp Co., Ltd., employs the psychological effect produced by artificial coal, aided by a reflector back; it is at the same time a very ornamental appliance. The frame is of solid brass with cast feet and side columns. Three 1,000-W bars are fitted, and the method of switching allows one, two or all of these to be employed at a time. Three finishes are supplied—brass, oxydised copper and oxydised silver. This company has also produced a smaller fire, the "H.1440" (fig. 5), similar in many respects to the other. Glowing "coals" and a reflector back are again employed, but there are only two 1,000-W fire-bars. The same finishes are available.

In designing a new range of "Vulcan" fires, the Arora Co. has endeavoured to combine robustness with portability. The bodies are of sheet steel mounted on cast-iron feet, and each fire has a substantial cast-iron top which forms a hob. This model is made in three patterns—with one, two or three bars (1,000, 1,500, and 2,250 W respectively). The three-bar type is shown in fig. 7. Two finishes, matt black and oxydised copper, are available. A notable feature is the ease with which the elements can be changed. The back is secured by two screws, and when it is removed, the whole of the interior hinges outwards.

The Credenda Conduits Co., Ltd., has incorporated the "Globar" element in two of its new fires. These rods (500 W) attain a very high temperature, and glow very brightly. Thus in combination with a reflector, they make a very effective substitute for a coal fire. The new models are in two sizes—1,000 and 2,000 W respectively. The new "Credacoal" fire (fig. 8) has a cast frame and a polished copper reflector, which directs the heat forward and downward. The heating elements are concealed behind the imitation coal.

The same range of bowl and ordinary type fires as last year is being sold again by Metro-Vick Supplies, Ltd. In addition, a new standard model designed to meet the demand for a moderately-priced 3-kW fire has been produced. This fire is illustrated in fig. 9. The elements are fitted in a horizontal position beneath a hammered copper reflector, and there is also a smaller reflector of the same type fitted under the firebars. The finish is oxydised copper. Improvements have been made in the method of attaching elements on the standard fires, making it possible to replace them without trouble.

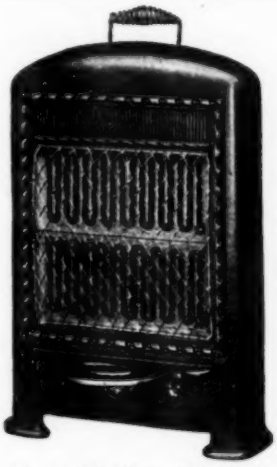


Fig. 1.—The Carron "No. 229."

Fig. 2.—The Carron "No. 256."

Fig. 3.—The "Heatrae Columbine."

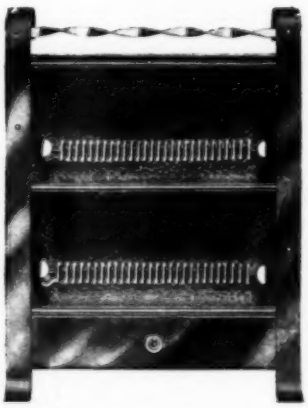


Fig. 4.—The "Heatrae Ptolomy."

Fig. 5.—The "H.1440" Fire.

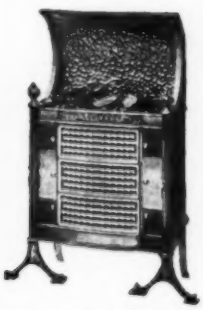


Fig. 6.—The "H.1450" Fire.

Fig. 7.—An Arora "Vulcan" Fire.

Fig. 8.—The "Credacoal" Fire.

Fig. 9.—A New "Cosmos" Fire.

Fig. 10.—The "Acton" Fire.

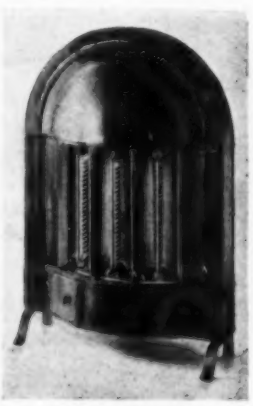


Fig. 11.—The "Greenock" Fire.

Fig. 12.—A New "Magnet" Fire.

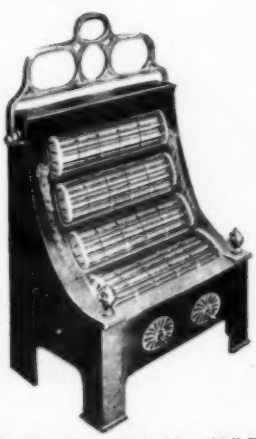


Fig. 13.—The "Tricity No. 678" Fire.

Fig. 14.—The "Revo Radiant" Fire.

Electric Fires for the Season.

Fig. 15.—The "Angelus" Fire.

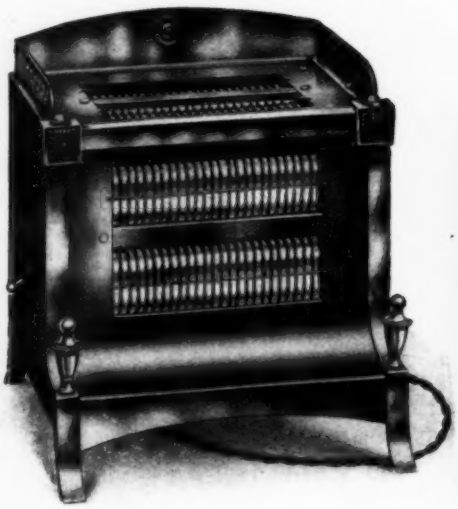


Fig. 16.—A "Maymore" Fire.

Fig. 17.—The "Gem" Fire.

Fig. 18.—The "Regent" Fire.

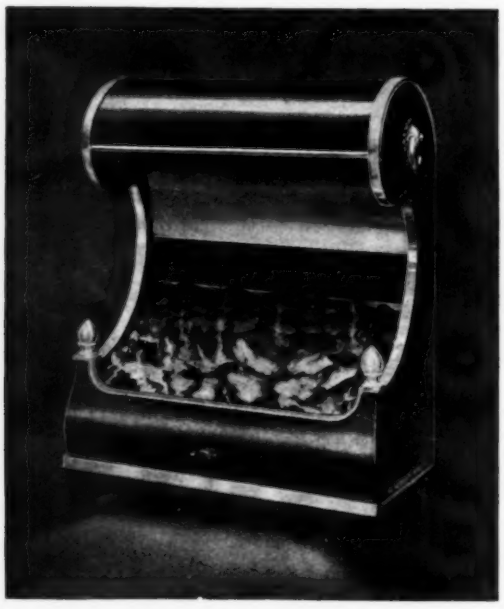


Fig. 19.—The "Newberry."

Fig. 20.—The "Adjusta" Fire.

Fig. 21.—The "Best-Ray" Fire.

Fig. 22.—The "New Sunbeam" Bowl Fire.

Fig. 23.—An Electric Heating Co. Fire.

Electric Fires for the Season.

Among the new designs of "Inventum" fires (Mr. Alan Wright) are the "Acton" (fig. 10) and the "Greenock" (fig. 11). Both are fitted with the "Inventum" plug-in bar, which is of unique construction and loaded to 500 or 750 W. The "Acton" model has a simple body into which are fitted two horizontal parabolic reflectors, each containing a fire bar. It is supplied in four finishes, *viz.*, black and brass, satin brass, bronze with brass relief, and all bronze. It weighs only 8¾ lb. In the "Greenock" fire the same type of reflector is employed, but it is mounted vertically. A wide choice of patterns is available. Three, four or six bars can be fitted, and the fire is produced in three finishes—oxydised silver, Florentine bronze, or crystallised black.

Fig. 24.—The "Salisbury" Fire.

The General Electric Co., Ltd., has produced, among other new designs, the fire illustrated in fig. 12. This is an ornamental cast-iron fire for placing in a fireplace. Three of the elements are fitted horizontally into a curved front, while the fourth is at the base of the fire. The total loading is normally 2,000 W, but it can be raised, if desired, to 3,000 W. The elements are switched in pairs, enabling half or full heat to be obtained. The fire is given either a matt black or an armour-bright finish.

Several of the new fires brought out by the British Electric Transformer Co., Ltd., are fitted with new coil elements mounted on steatite bases of sectional construction, as an alternative to the company's "Flame" elements. The new elements have protecting rods incorporated in their construction, and the loading of the bars is raised from 600 to 800 W. The fire illustrated in fig. 13 is the "No. 678," with four horizontal bars (3,200 W). The new models are of pleasing appearance.

Fig. 25.—A "Sunco" Fire.

Fig. 14 shows one of the new designs of the Cable Accessories Co., Ltd. This "Revo Radiant" fire employs non-metallic rod elements of simple construction. It is finished in nickel and copper. A hinged guard simplifies cleaning, and the handle, which is attached to the back, is air-spaced from the reflector, keeping it perfectly cool. In another model produced by the company the elements are placed under a light cast top, and are not directly visible. The heat is directed outwards by a reflector. The company is also making a small adaptable heater employing an element of the bowl-fire type.

Messrs. Charles Joyner & Co. are the makers of the fire shown in fig. 15, which is another of the imitation coal type. The element (1,750 W) is at the foot of the reflector, and the frame is finished in Florentine bronze or oxydised copper. A new bowl fire by this firm (the "New Sunbeam") is illustrated in fig. 22. This has an easily-replaced coiled element (750 W), and weighs 3¾ lb. It is fitted with a strong guard, and can be swung into a horizontal position for boiling a kettle.

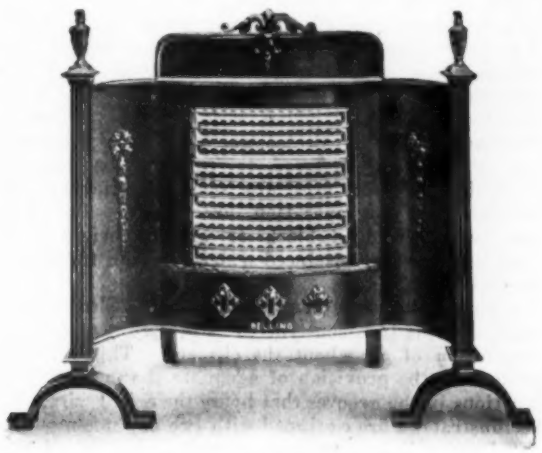


Fig. 26.—The Belling "Corinthian" Fire.

A fire of the dual-purpose type is shown in fig. 16. This is one of the "Maymore" designs made by Messrs. May & Padmore, Ltd. The fire has two bars fitted into its front, while in addition a further pair is housed in the top, and provides sufficient heat to boil a kettle or saucepan very easily. Each bar has a loading of 750 W, making a total of 3 kW. The appearance of the fire is very attractive, there being no superfluous ornamentation. The body is of armour bright stainless steel, and the fittings are made of polished brass. The weight is 15 lb., and the fire measures about a foot in each direction.

The "Gem" fire, depicted in fig. 17, is one of the "Hotpoint-Falco" range sold by the Hotpoint Electric Appliance Co., Ltd. It is of plain but neat design, suitable for a study or library. It is fitted with one, two or three 1,000-W bars (fig. 17 is the three-bar model). Another "Hotpoint-Falco" product is the "Regent" (fig. 18), a fire of more ornate appearance.

Fig. 27.—A "Premier" Fire.

It has a cast-iron frame and sheet metal body, and can be fitted with two or three 1,000-W fire-bars; a number of finishes are available. Both of these fires are fitted with foot-operated switches.

Berry's Electric, Ltd., is putting several new "Magicoal" fires on the market for the coming season. One of the best of these is the "Newberry" model, illustrated in fig. 19. In this the heating element (2,000 W) is mounted above the glowing coal, and the

curved reflector throws the heat forward and downward very efficiently. The standard finish is black and polished steel; a special hammered rustless steel finish can be provided. The fire is 16½ in. wide, 23½ in. high, and 10 in. deep; it weighs 30 lb.

The fire illustrated in fig. 20 is novel in its method of mounting. It is the "Adjusta" fire, made by Messrs. H. W. Sullivan, Ltd., and consists of a 2-kW fire in black enamel with nickel-plated relief, fitted upon a stand which enables it to be fixed at any required angle.

Fig. 21 illustrates one of the new models brought out by Messrs. Best & Lloyd, Ltd. It embodies two bars of a new type, specially designed for horizontal fitting. The grooves are shallow so that the glowing coils are visible at an acute angle, thus increasing the field of reflection. This fire (the "Best-Ray") is fitted with a trivet which can be tilted backward or forward for toasting or keeping things warm. The ventilation of the reflector is designed to prevent discolouration to which reflector fires are somewhat liable. Two switches for foot operation are fitted. The finish can be either dead black or armour bright. The company has also produced a new fire bar for vertical mounting.

A new fire bar has been designed by the Electric Heating Co. This is so constructed as to permit of a perfect circulation of air about the element. This is accomplished by the provision of adequate channels and perforations in the grooves that house the coiled wire. Fig. 23 illustrates a fire equipped with two of these new bars.

"Bastian" fires are distinctive on account of their elements, which consist of "Quartzalite" tubes upon which the wire is coiled. The result is a solid red glow of cheerful appearance. The "Salisbury" fire illustrated in fig. 24 is one of the models produced by the Bastian Meter Co., Ltd. This is equipped with three horizontal "Quartzalite" bars, giving a total loading of 2 kW, and a three-heat switch. The standard finish is black with gold outline, but the fire can also be supplied in gold with a blue outline.

The Sun Electrical Co., Ltd., has recently issued a comprehensive list of fires of many makes. Among the "Sunco" patterns is the fire depicted in fig. 25, which is a Hepplewhite period model fitted with two of the company's convex fire bars, each loaded to 500 W, with a two-heat control. The fire is made in three finishes—black enamel, antique copper and sanded brass.

Messrs. Belling & Co. have also published an attractive catalogue for the fire season, and from it we have selected the "Corinthian" model shown in fig. 26 as an example of artistic workmanship. Three "Multi-Parabola" fire-bars are fitted, giving a total loading of 3 kW. This type of bar has 75 small parabolic wells, which focus the heat-rays and project them straight out. Each bar is separately switched. The "Corinthian" fire is made of stout sheet brass, which is finished in any one of four styles, *viz.*, polished brass, satin brass, oxydised copper, and oxydised silver.

Several new patterns have been produced for the season by Premier Electric Heaters, Ltd. One of these is shown in fig. 27. This has four elements situated below a curved reflector back, the total loading being 3 kW. One element is connected direct, while the others are separately switched. The fire is produced in antique copper or oxydised silver finishes.

Electric Cooking.

Recent Developments in the Design and Construction of Apparatus.

While the outstanding feature at the present time in connection with apparatus designed for domestic cooking by means of electricity is an apparent slowing-up of progress in the development of equipment of the usual design, the last few months have seen the appearance of a few quite revolutionary suggestions for electric cooking, both in the main principles of such operations and in the construction of the apparatus. Quite recently we received from Sweden information with regard to the practice in Stockholm of cooking by means of an appliance (the Seves cooker, Electrical Review, September 17th, pp. 445 and 473), in which heat, electrically generated, is stored during periods when advantage to the consumer is obtained by reduced charges, and to the generating station by load-factor improvement, and utilised by the cook at her convenience. In this connection it is interesting to recall the description given in our "Correspondence" columns of September 24th last, by Mr. W. Fennell, general manager and engineer of the Mid-Cheshire Electricity Supply Co., Ltd., of an American cooker which embodies the fireless-cooker principle in a boiling chamber at the bottom. The boiler chamber has a cut-off switch thermostat operated by steam issuing through a small hole. The lagging is said to be so good that stewing can go on for an hour or so after the supply is cut off.

In our issue of April 2nd, 1926, we described new electrical cooking equipment introduced by the Falkirk Iron Co., Ltd. It will be recalled that in this apparatus the necessary heat for cooking is obtained by inducing currents, in the case of boiling operations, in the cooking receptacles, and in the case of meat-roasting, in the foodstuff itself—the meat or the utensil, according to the class of cooking, being itself the secondary winding of a transformer.

The part of the usual electrical cooker which calls for improvement more than any of the other sections, on account of its low efficiency, is the boiling ring. In two instances recently we have also been able to give information concerning new designs of boiling plates for which are claimed efficiencies far higher than are obtained in the types of boiling plate generally incorporated in the domestic cooker. We refer to the "Quead" boiling ring, marketed by Messrs. Wm. Geipel & Co., and to the new "Cosmos" boiling plate of Metro-Vick Supplies, Ltd. In the latter case the new apparatus has been incorporated in a new model of electric cooker. This plate (Electrical Review, June 18th, 1926, p. 935) utilises the usual high-resistance element, but by means of the absolute embedding of the element spirals in the insulating material, by virtue of a unique process described in the issue referred to, the high efficiency is obtained by the transfer of the heat from the element to the cooking utensil almost entirely by conduction. Inversely, in the "Quead" apparatus, the heat transference is effected almost solely by radiation (Electrical Review, July 9th, 1926, p. 77). The high-resistance-wire principle is employed here also, but the heat is reflected, by means of a conical reflector surrounding the vertical element, to the bottom of the utensil.

Such drastic developments in so short a period are almost bound, we suggest, to be followed by an apparent slackening of progress in the usual design of apparatus. The possible opportunities offered to manufacturers by these innovations in the field of electric cooking, for the improvement of their equipment or for the creation of entirely new designs, with perhaps the employment of new principles, lie in widely different directions, and time must be allowed for reviewing and experimental work. As one firm puts it, the designing of electric cooking apparatus is in a transitory stage. This seeming dearth of new designs in the generally-accepted type of electric

cooker does not suggest any slump in the electric cooker business; there is evidence that the supply authorities are still forging ahead with this important load, and, where the charges for electrical energy consumed for cooking purposes have been brought down to a level in keeping with up-to-date power-station design and operation, the electric cooker is proving its worth as a competitor against the coal, oil, or gas stove, taking into consideration in all cases its vastly greater advantages in regard to health, cleanliness, and labour saving. To our mind the period of what might appear to be marking time precedes one of increased activity and progress.

Fig. 1.—Cooker with High-Efficiency Boiling Plate.

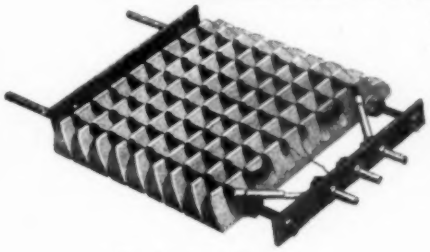


Fig. 2.—Spiral-Wire Plate.

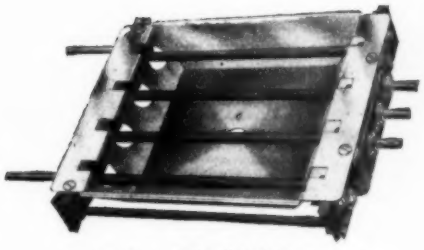


Fig. 3.—"Globar"-Rod Plate.

Fig. 4.—"Bijou" Cooker.

Dealing with new and improved designs in complete domestic cookers first, *i.e.*, cookers with provision for dealing with all the usual domestic cooking requirements for the ordinary household, probably the most interesting is the new "Cosmos" cooker already referred to, fig. 1, in which is included the new type of boiling plate. Ordinary stout spiral-type open elements are used in the oven, and are threaded through porcelain eyes held in bracket supports. The new "Cosmos" cooker is provided with a special thermometer, which can be fitted either on the door or on the right-hand side of the cooker.

An interesting development introduced in the "Creda" electric cookers of The Credenda Conduits Co., Ltd., is the provision of "Globar" rod-resistance-type elements. Figs. 2 and 3 illustrate how the "Globar" rods are housed in a plate of the same shape and dimensions as the makers' usual open-type plate, so that the new unit can be used as an alternative. The advantages claimed for the new elements are that they are unaffected by liquid foods being spilt over them, and that they may be short-circuited without harm beyond the blowing of the fuses.

A new "Creda" model introduced this year is the "Bijou" cooker, fig. 4. This is constructed about a cast-iron frame and embodies several of the features of the larger appliances, including the removable oven interior and side and bottom heating in the oven. A large grilling and plate-warming compartment is provided, and the cooker is well finished throughout; the oven is heavily lagged. The maximum loading of this cooker is 2.7 kW, and it should prove suitable for use in flats and housing schemes where the supply of current available is limited.

The larger models of this make have been improved in various details; china insulation is now used in cases where mica was previously employed, and special attention has been paid to improvements in finish.

A commendable feature of "Creda" cookers is the fact that the boiling-plate and grill elements are all of the "plug-in" variety and are made interchangeable, and only two types of spares are necessary, *viz.*, a 750-W spiral, which is used in all the grills and boiling plates, and a 100-W element, which has been adopted for all sizes of ovens. It is claimed that these improvements have resulted in a considerable reduction in maintenance costs. Five different models of electric cookers are now being manufactured by this firm, and we understand that a further model will shortly be available.

Fig. 5.—Cooker for Limited Accommodation.

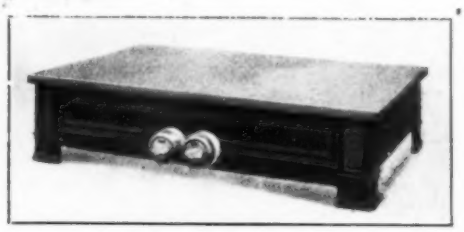


Fig. 6.—Electric Baking Plate.

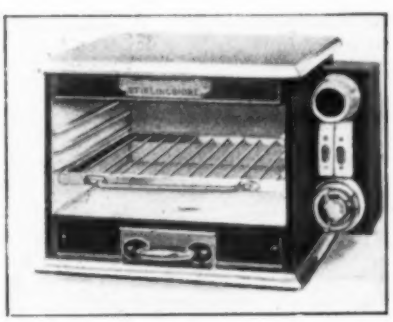


Fig. 7.—Electric Grill.

An introduction of the Electric Heating Co. is a new oven, model 222, in which the door is of the drop pattern, with an attachment to absorb the shock should the door be allowed to drop by its own weight. The handle is of the swivel type, and by a slight pressure the door can be shut perfectly tight. The hob of this cooker is fitted with three boiling plates, each of 1,500-W capacity, and one grill.

Fig. 5 illustrates the most recent production of Messrs. Siemens & English Electric Lamp Co., Ltd., "Xcel" range No. H.1060. It is specially designed for

use in small houses and flats, and is equipped with one boiling plate and one combination grill-boiling plate. The overall dimensions of the cooker are: height, 36 in.; width, 24 in.; and depth (back to front), 20 in. The oven cooking-space dimensions are 14 in. by 13 in. by 15 in. The cooker is supplied in the standard finish. The general construction provides a cast-iron framework, door and hobplate, with the body of

Fig. 8.—Quick-Boiling Hot Plate

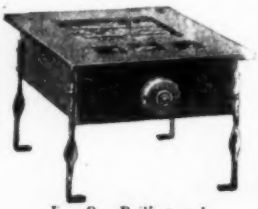


Fig. 9.—Boiling and Simmering Plate.

heavy-gauge sheet-steel plates, well protected from rust. The oven is heated by parallel side elements, each of 350-W capacity, made to fit on to standard busbars, and located so as to give a maximum of bottom heat, with two elements nearer the top for browning. These are all protected by sheet-steel gate linings swung on hinges so that they may be readily cleaned or removed altogether. The interior of the oven is rounded in the corners. Provision is made for altering the position of the elements to suit individual requirements or for localising the heat. The control is by reciprocating 3-heat snap switches with "Zed" fuses in circuit. The boiling plate is of the usual open-type design built on a circular fireclay slab, with deep containing grooves. The entire boiling plate can be instantly removed for cleaning or renewal, and the design is such that the vessels are in very close proximity to the source of heat. The maximum permissible loading for the boiling plate is 1,800 W, the average being 1,500 W. To meet the wishes of supply engineers who prefer the semi- or completely-enclosed boiling plate, cast grid plates, to fit in the recess over the top of the open plate, can be supplied, but this reduces the boiling efficiency from cold by approximately 12 per cent. The grill is composed of parallel fireclay bars through which nickel-chrome spirals are threaded, the complete element being provided with three plug-in terminals, making contact in the same manner as the boiling plates.

Carron Company has evolved a very wide range of electrical apparatus for cooking operations, apart from the usual requirements for which the orthodox cooker is designed. Fig. 6 shows an electric baking plate. It is constructed of cast-iron with a ground flat top-plate, the body being of black finish. The elements are of the open-coil type, the resistance coils being threaded through porcelain formers; they are controlled by 3-heat rotary switches. The plate is made in sizes with loadings varying from 3 kW to 12 kW, and the smaller models should prove of value in cases where cooking is not done regularly and where space is limited. Fig. 7 shows an electric grill which should prove useful in similar instances. It is constructed of cast iron, and has a grilling compartment, an enamelled bottom-plate, a strong steel brander with a loose mesh grid and a tinned-copper gravy pan. The bottom plate is arranged so that fat will run through a hole provided for the purpose into a copper tray which can be easily drawn out when necessary; the top surface of the hob is finished black. The elements are loaded to a maximum of 4 kW and controlled by a rotary indicating switch mounted on the side of the grill, with a fuse and pilot lamp. This apparatus can be provided with two compartments, with a maximum loading of 8 kW; the double-compartment model can also be supplied with a hot-closet on the top, having sliding doors and heated by waste heat from the grill elements. The grilling compartment is 16 in. wide by 17 in. deep.

Another useful addition to the Carron apparatus is an electric Bain Marie, which is particularly suitable where boiling operations only are required. This is supplied with a welded steel pan, six planished copper pots with copper lids and side handles, and a draw-off tap. The heating elements are easily accessible, and are controlled by a 3-heat rotary switch. The overall dimensions are 27 in. by 18 in. by 4½ in. deep. The loading is 2 kW.

Messrs. H. W. Sullivan, Ltd., have introduced some new models designed particularly for places of limited accommodation. The "Hussif," fig. 10, is a complete cooker with limited overall dimensions of 28 in. high, 20½ in. wide, and 17 in. deep; the oven dimensions are 12 in. each way. The cooker is fitted with a boiler-grill which can be regulated for loadings of 375, 750, and 1,500 W. Similar loadings can be obtained on the oven elements. These are of the "Uni-

Fig. 10.—The "Hussif."

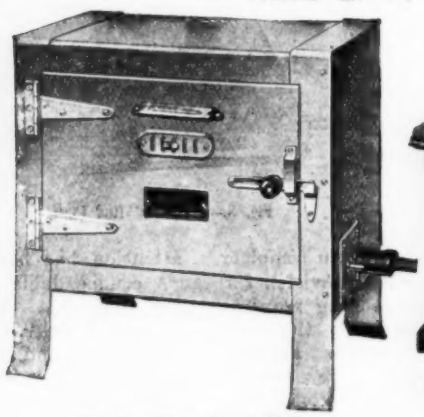


Fig. 11.—The "Lampholda."

Fig. 12.—"Little Wonder" Oven.

Fig. 13.—Kitchen Cooking Outfit.

glow" type and the boiler grill elements are of the "Bridge" type. Fig. 11 shows a small oven, "Lampholda," which is intended for use in houses where only lighting circuits are available for a supply. Its overall dimensions are 19 in. by 16 in. by 12½ in., the oven measurements being 12 in. by 8½ in. by 8½ in. Heat regulation is obtained by means of four plugs, giving three loadings of 666, 333, and 166 W.

The Bastian Meter Co., Ltd., has also introduced some interesting small-type cooking apparatus. Fig. 8 shows a small hot-plate designed for quick-boiling operations. It is 12 in. long by 7 in. wide, and is equipped with 3-heat control with a maximum loading

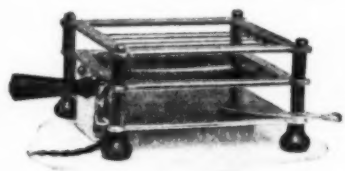


Fig. 14.—Grill-Toaster.

of 1,000 W. Another development is the "Little Wonder" grill oven, fig. 12, designed especially for the small home. On this model it is possible to undertake all the usual cooking operations, and it is suitable for hot-cupboard usage. It is provided with the usual 3-heat regulation. Its dimensions overall are 10 in. high, 15 in. wide, and 9½ in. deep, and its total weight is 20 lb. Each of these appliances is fitted with "Quartzalite" glower elements which, it is claimed, are immune from damage due to the spilling of hot liquid foodstuffs over them.

Fig. 9, p. 672, illustrates a boiling and simmering plate marketed by The Arora Co. It is constructed of sheet metal, with a cast-iron top plate. The heating elements are of the open type and are arranged for 2-heat regulation, boiling and simmering, with respective loadings of 1,330 W and 750 W. This apparatus weighs 14½ lb. Fig. 13 shows a simplified kitchen outfit introduced by this firm. It comprises a portable oven and two open-type boiling plates mounted on a sheet-metal table. An interesting feature of the "Arora" products is the type of element used—namely, a very substantial spiral produced from "Kromore," manufactured by Messrs. British Driver Harris Co. Samples of the heating elements have been tested after 18 months' service in an ordinary household, and, it is claimed, their electrical consumption showed no decrease, and no oxidation had taken place whatever; in one case it is reported that the drawing marks from the original "Kromore" were still left on the strips.

Fig. 15.—Utility Cooker.

The Coventry Electrical Accessories, Ltd., has introduced a range of small apparatus such as table toasters. Fig. 14 shows the "Ceal" grill toaster. This consists of three aluminium castings of very heavy gauge. The element is built up in the centre one of the three plates, and the whole is bolted together in a substantial manner. This device is suitable for such operations as toasting and kettle boiling. One model of the upright toasters made by this firm has a handle at the top for lifting, contrary to the usual practice of placing the handle at the side near the base.

In addition to the heavy "Xcel" cooker already referred to, Messrs. Siemens & English Electric Co., Ltd., have introduced a small utility cooker, fig. 15. This is a convenient cooker for small families of two or three people, and comprises the cooking unit, deep and shallow pans, a grill plate, and a connector. It can be plugged in to any convenient lamp socket and used with equal facility in the dining room, breakfast room, or kitchen. Light meals, it is claimed, can be prepared at a very low expenditure for current. Cooking can be carried out simultaneously both above and below the "grid," grilling being done in the deep pan and frying or boiling above. Toast can also be made by placing bread slices either directly on top or below the grid. A deep covered saucepan or stewpan placed on top of the grid, with the deflector plate beneath, provides an efficient combination for light baking or stewing. The overall finish is of heavy nickel-plating, and both utensils are furnished with ebonised wood handles. The pull-out connector constitutes a convenient switch for controlling the cooker, and an insulated handle on the opposite side furnishes a cool grip for steadying the appliance whilst inserting or removing the connector. The utility cooker is made in two sizes, one with a single-heat loading of 600 W, and the other with a 3-heat regulation with loadings of 250, 450 and 650 W.

A range of small table cooking apparatus has been introduced by Messrs. May & Padmore. Fig. 17 shows the "Maymore" electric boiling plate, which, it is claimed, can be used for an ordinary kettle as well as for such operations as grilling and frying. The cast-iron top is machined dead flat and polished, and the legs are finished nickel-plated. Its maximum loading is 850 W. It can be supplied for single or varying heats.

Fig. 16 shows a new boiling plate introduced by Metro-Vick Supplies, Ltd., in which is incorporated the new "Cosmos" high-efficiency unit already referred to.

From the point of view of efficiency, the ordinary type of domestic electric cooker with which we are acquainted may be said to be incomplete as a cooking outfit without an electric kettle. Many supply undertakings include an electric kettle with each cooker let out on hire. Fig. 18 shows an interesting electric kettle which is marketed by the British Electric Transformer Co., Ltd. It is a 3½-pint copper kettle for kitchen and general hard use, and is fitted with a semi-automatic switch fitted under the connection box. Immediately the kettle is lifted or tilted, the switch automatically flies off with an easily-heard click.

Fig. 16.—"Cosmos" Plate.

Fig. 17.—"Maymore" Plate.

Fig. 18.—Electric Kettle.

Electric Water-Heating Apparatus.

There are many forms of electrical apparatus for heating water, as there are many purposes for which hot water is required in the home. Generally speaking, there are three heads under which they can be classified, *viz.*, culinary and cleansing, bath-water heating, and clothes washing. Occasionally, of course, hot water is employed for the heating of rooms, but the main sphere of this system is outside the home. Appliances are usually designed specially when electricity is used as the heating agent, but it is possible by the employment of suitable immersion heaters to convert all kinds of existing apparatus. For this reason we give below not only brief descriptions of purely electrical appliances, but also some examples of electrical elements for application to tanks, geysers, &c.

Messrs. George Nobbs, Ltd., are specialists in this class of work, and they have produced a number of new appliances of various types. The "Genii" electric geysers made by the company are of neat appearance, and are easily installed. Five sizes are made ranging from 3 to 10 kW; the appliance illustrated in fig. 1 is typical of the lower capacities. The geyser is made in two parts, a body and heater of brass and copper, tinned inside and nickel plated outside; and an interlocked switch and water valve which can be fixed in a convenient position away from the bath or basin. The elements are thoroughly insulated from the water, and the interior is such that the water is fit for drinking purposes.

The "Vectis" storage water heater, made by the same firm, is particularly suitable for local authorities' hiring schemes. It consists of a double-jacketed copper lagged tank, which may be connected to the cold-water mains or house-storage tank and fixed over a bath or sink. It is made in sizes from 5 to 30 gal., and may be fitted for constant current, low-heat, and booster loading for abnormal demands. Fig. 2 illustrates the appliance.

Among the apparatus produced by Messrs. Archibald Low & Sons, Ltd., is an automatic combined cistern tank, designed to be placed in any position and connected up to a cold-water supply. The tank is of copper, efficiently lagged, and protected by a steel case, the top part of the latter forming a ball-valve cistern, as shown in the accompanying diagram (fig. 3). A double thickness of lagging is provided between the top of the water tank and the ball-valve cistern, the immersion heater and thermostatic switch being fixed at the bottom. The elements are made of hard, clear mica

Fig. 1.—A "Genii" Geyser.

Fig. 2.—The "Vectis" Water Heater.

Fig. 3.—The "Highlow" Tank.

Fig. 4.—The "Jackson" Wash Boiler.

Fig. 5.—A Water Urn.

Fig. 6.—A Domestic Water Heater.

encased in solid drawn copper tube rolled flat, tinned all over and brazed to the screwed holder. The tank is made in four sizes ranging from 5 gal. (500 W) to 20 gal. (1,250 W). It is fitted with a mercury thermostat and, if desired, with a contactor switch.

The "Jackson" wash boiler (Jackson Electric Stove Co., Ltd.) is a simple but useful device for the home. It comprises a 10-gal. tank mounted on a tripod. The elements (3 kW) consist of fireclay formers, suitably mounted, the spirals running in grooves. They are enclosed in solid-drawn tubes, welded or brazed into a sump, the last forming the bottom of the boiler. All the wiring is in pure nickel on to terminals mounted on porcelain insulators. The body is of galvanised steel or polished copper. The boiler is illustrated in fig. 4, fitted with a special spraying device which can be supplied. Another water-heating appliance made by the same company is the water urn shown in fig. 5. This is made of heavy-gauge copper, internally tinned. The heating elements are clamped to the underside, the studs holding the clamp plates are brazed to the bottom (there are no holes), and the electrical connections are of solid rod or strip. Nickel strip under mechanical pressure forms the connection between the element and the bus-bar, which is insulated with porcelain. Even if the urn is accidentally boiled dry, no serious trouble is likely to happen. A three-heat control switch is fitted, and a suitable terminal box is provided to accommodate the incoming leads. The urn is made in four sizes ranging from 1 gal. (1 kW) to 4 gal. (3 kW).

In the immersion heater made by Electric Fires, Ltd., Norwich, the element is arranged for heat regulation, and a switch can be combined with the heater to form a complete unit. Fig. 6 shows a domestic hot-water supply tank made by this company. It is rectangular in form and is fitted with a ball-valve operating in an independent ball-valve chamber, which is heat-insulated from the main bulk of water. It has an overflow pipe and a draw-off tap of large size. The water chamber is well lagged and enclosed in an outer, white-enamelled casing. The tank is usually fitted with a small constant heater and a separate booster heater, and is made in four sizes ranging from 10 to 30 gal., with appropriate loadings.

A combination of hot-water storage and pre-heating arrangements is employed in the boiler illustrated in fig. 7 (Jackson Boilers, Ltd.). The water is fed from a ball-tap cistern to a boiling chamber in which an immersion heater is fitted. When it reaches boiling point the water is deflected into a collecting chamber, in which its temperature is maintained by a jacket which is an extension of the boiling chamber. The bottom of the collecting chamber and the top of the boiling chamber is specially shaped to deflect steam to this jacket and an expansion pipe. If the boiling water is not drawn off, it fills the collecting chamber and overflows into the bottom of an outer shell, heating its contents.

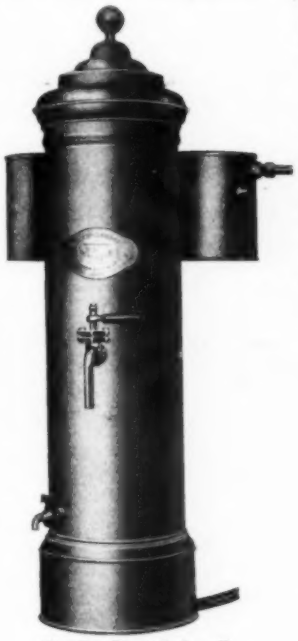


Fig. 7.—The "Jackson" Boiler.

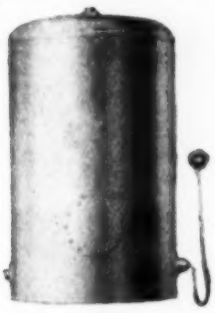


Fig. 8.—The "Magnet" Calorifier.

The "Magnet" calorifier (fig. 8), supplied by the General Electric Co., Ltd., is a large-capacity appliance consisting of a 20-gal. cylinder equipped with a 3-kW immersion heater of the double-bladed type; the latter has a three-heat control if hand-operation is required, otherwise a straight "on" and "off" action is provided by a thermostatic control and relay switch. It is claimed that the calorifier will give its full 20 gal. of boiling water 3½ hours after switching on.

Vacuum Cleaners.

It may be said that the vacuum cleaner is the principal labour-saving device for the home. By its aid, floors and their coverings, furniture and hangings can be efficiently and quickly cleaned. The vacuum cleaner is the only means of cleaning and dusting which really gathers the dust instead of merely displacing a great proportion of it. Vacuum cleaners may be broadly separated into two classes, namely, those in which the motor, nozzle and dust bag form a complete unit, and those in which the motor and dust container are separate, remaining stationary while the nozzle on the end of a flexible tube is carried to the points of application. Most electric vacuum cleaners are of the first type, and they vary only in matters of detail, the importance of which is difficult to estimate; the fitting of brushes is a case in point. We illustrate a few typical examples, noting the special points emphasised by their makers.

The General Electric Co., Ltd., has designed a vacuum cleaner with a number of new points. The chief of these appears to be the shape of the nozzle, which finishes in an almost horizontal position, enabling it to be pushed under furniture. It also has a brush at the extreme end of the nozzle. The front pair of wheels is well out of the way of the nozzle; the single rear wheel is swivelled, facilitating the steering of the machine, which is illustrated in fig. 1.

Fig. 2 depicts an example of the other type of vacuum cleaner in which the motor and dust container remain stationary (although they are mounted on wheels for moving from place to place). This is the "Dunco" machine supplied by Messrs. Duncan Watson & Co. The motor is rated at ¾ h.p., and the equipment includes many types of fittings for attachment to the long flexible tube connected to the body of the machine.

The foregoing machine is designed principally for large establishments. A machine of the same type, but on a smaller scale, more suitable for the home, is available in the shape of the "Turbinet" (fig. 7), which is made by the British Vacuum Cleaner and Engineering Co., Ltd. The machine is mounted on rear castors and front inverted domes, and 21 ft. of flexible tubing is supplied, to which a number of accessories can be fitted. At the rear of the body is a blowing nozzle, to which the tube can be attached if desired.

One of the main features of the "Eureka" vacuum cleaner (Electric Appliances Co., Ltd.) is the method of propulsion. The front and rear lips of the nozzle are rounded, and there is a castor at the rear which enables the machine to glide along the surface. The brush which fits into the nozzle is detachable, and is of the "sweep-action" type. This is a useful arrangement, for a brush is not always necessary. The simple

connection of the dust bag is also an excellent feature. Fig. 3 illustrates the machine.

The "Croydon" 1926 model (fig. 4) is an all-British machine made by the Croydon Engineering Co., Ltd. In this the motor is mounted vertically above the nozzle, and the cleaner is claimed to be the only one with a stationary brush which presses back the pile of a carpet

This season's "Xcel" machine (Siemens and English Electric Lamp Co., Ltd.) is said to have a suction of unusual strength, enabling the heaviest carpets to be lifted. The cleaner is fitted with a double brush to loosen hairs, &c., from carpets to facilitate their collection. The nozzle has a 13-in. opening, and is adjustable as to clearance from the surface being cleaned by

Fig. 1.—The "Magnet" Cleaner.

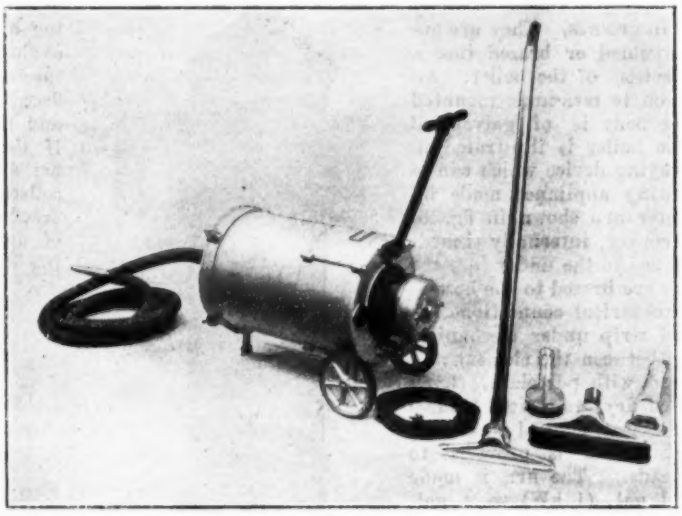


Fig. 2.—The "Dunco" Cleaner.

Fig. 3.—The "Eureka" Cleaner.

while the nozzle is enabled to, as it were, get to the root of the matter. The appliance weighs only 11 lb.

Fig. 5 illustrates the "Universal" electric cleaner, which is one of the brushless type relying on the suction alone. The latter gives a water-gauge figure of 17½ in. There are many distinctive features, such as the serrated nozzle, which facilitates the collection of

a rear castor. A rubber guard forming part of the brush prevents the scratching of polished floors. The machine is shown in fig. 6.

A useful appliance is now supplied with every "Standard" vacuum cleaner by Standard Telephones and Cables, Ltd. This is the "Vac-Mop" illustrated in fig. 8. The uses to which this mop can be put are

Fig. 4.—The "Croydon 1926" Cleaner.

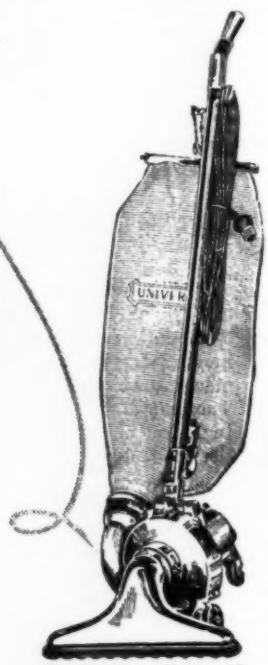


Fig. 5.—The "Universal" Cleaner.

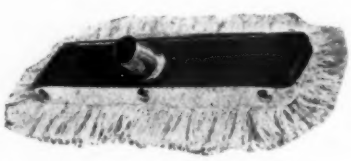


Fig. 8.—The "Vac-Mop."

Fig. 6.—The "Xcel" Cleaner.

Fig. 7.—The "Turbinet" Cleaner.

threads and hairs while preventing the machine from sticking to a carpet. The handle terminates in a convenient pistol grip, and a hinged handle terminal eliminates exposed leads from the motor to the handle. The bag is attached by a simple locking collar, and has an inner sleeve which acts as a valve, preventing dust from falling back into the machine when it is being emptied.

numerous. "Lino" surrounds can be thoroughly dusted after the carpets have been cleaned, flour and crumbs can be readily picked up from linoleum, and adhering dust on any polished surface removed without the slightest risk of damage. The soft cotton mop is affixed to the body of the machine with press buttons, and can therefore be readily detached at any time when it requires washing.

A New Automatic Sub-Station.

The Soho Square Distributing Station of the Charing Cross Co.

THE new Soho Square automatic sub-station of the Charing Cross Electricity Supply Co., the opening of which we referred to in our last issue, is distinct, apart from several interesting features in its equipment, in

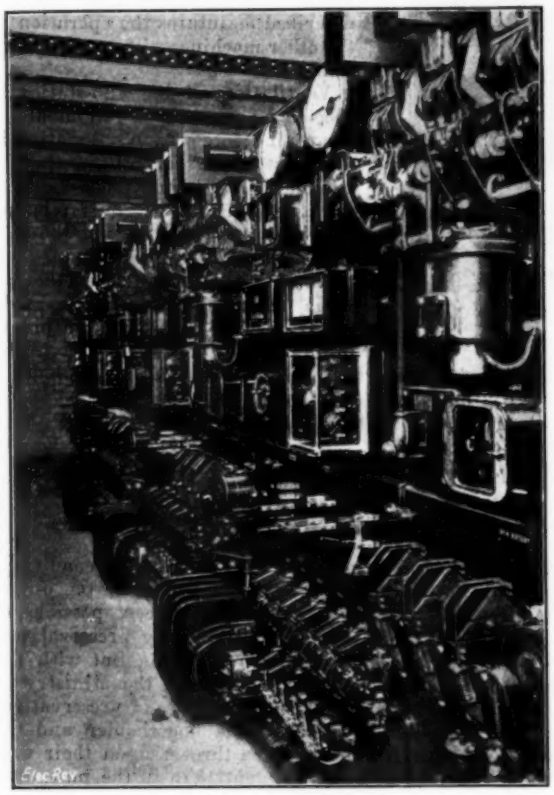


Fig. 1.—Automatic-Control Gear.

that it is believed to be the only sub-station in existence which embodies a fully automatic sequence control for four machines, and the only one of its kind in this country arranged underground. In the congested areas of our big cities, where the cost of building space above ground is practically prohibitive, the latter feature is of great importance, and the use of underground automatic sub-stations may prove to be the solution to the problem of dealing with overloaded networks in such areas.

The sub-station was originally a large street box containing six mercury-arc rectifiers, with a total capacity of 200 kW. In 1925 the plant was taken out and replaced by two 300-kW rotary-converter sets arranged for fully automatic operation. Additional extensions and improvements to the station have now been completed, and the underground space has been extended by an annexe 45 ft. long, 26 ft. wide, and 10 ft. high, excavated under the Soho Square gardens. The equipment now consists of four 300-kW rotary converters, together with the necessary transformers, switchgear, and automatic control gear, to convert the incoming 10,000-V, 3-phase, 50-period, a.c. to d.c. at 202-212 V. The apparatus is designed to run entirely without attendance, apart from occasional visits for inspection, the station starting up automatically when the voltage drops on the d.c. mains and shutting down as the load falls off. The voltage-regulating equipment is designed to maintain the pressure on the d.c. distribution network to within 0.5 V above or below the desired value, and the automatic control gear is arranged to give sequence control to the whole of the machines installed. Provision is made for the installation of a fifth machine at a later date.

Fig. 2 shows the layout of the sub-station. The h.p. supply to the "sub" is transmitted by two 10,000-V underground feeders terminating in sheet-steel cubicles equipped with h.p. switchgear, each unit having a breaking capacity of 150,000 kVA. Oil switches control the supply to the machines, and bus-bar sectionalising switches are provided so that two machines can be operated from each feeder. The a.c. supply pressure for the rotaries is reduced to 152 V by 3/6-phase, oil-immersed transformers. The cooling radiators for these are arranged as separate detachable units; this provision was necessary in order to pass the apparatus through the small entry to the sub-station, a 5-ft by 3-ft. pavement manhole. The converters, fig. 3, are standard Metro-Vick tap-starting machines operating at 1,000 r.p.m., and supplying d.c. at 202/212 V through the feeder circuit-breakers to the network.

A low-pressure d.c. control switchboard provides four machine panels, and a separate panel accommodating the sequence control gear. The l.p. d.c. bus-bars are in duplicate, with change-over switches for connecting each machine to either set of bus-bars. The a.c. automatic control panels for the machines, fig. 1, accommodate standard Metro-Vick-type automatic equipment (ELECTRICAL REVIEW, December 15th, 1922, p. 906), which is arranged for starting up the first machine when the bus-bar voltage falls below a certain value, and the second and subsequent machines when the load on the bus-bars exceeds a predetermined figure. When the load on the bus-bars falls to a value which can be carried by fewer machines than are operating, the last machine in the sequence is disconnected and shut down. In each case, time-delay devices prevent operation of the apparatus if the change of conditions is not maintained for a predetermined period of time.

A novel feature which is of special interest and importance is the provision which is made for pre-

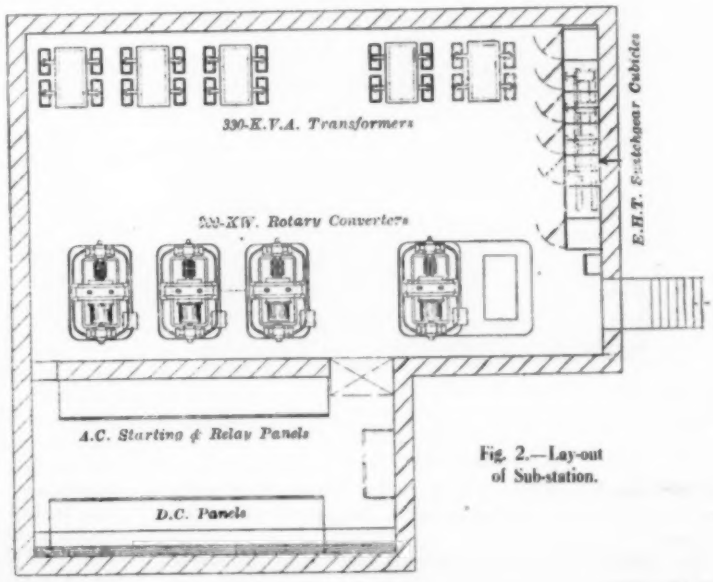


Fig. 2.—Lay-out of Sub-station.

arranging the sequence in which the machines are to start and shut down. The starting panel for each machine is fitted with a receptacle into which any plug

for connecting the sequence control leads for one machine can be inserted, and, according to the position selected, that machine will start up first, or second, and so on, in order. The plugs have differently arranged contacts, and constitute a set so that whatever the order, a complete sequence is always obtained. The order of shutting down is similarly controlled by the sequence apparatus in the reverse order to starting up. Should any machine be locked out, due to a fault, when its turn comes to start up, the automatic apparatus will immediately start up the next machine in the sequence. In the event of a machine failing to connect in its turn for any reason other than lock out by the protective gear, the next machine in the sequence will be automatically started after a time delay sufficient to allow the other machine to have operated.

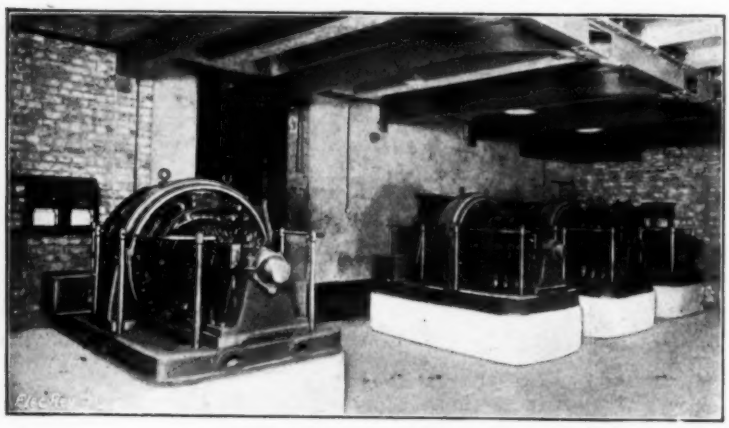


Fig. 3.—Sobo Square Sub-Station.

Fig. 4 shows the motor-driven drum controller by means of which the sequence control is operated. The various relays cause the motor to drive the drum by stages in a forward or reverse direction as required to start or stop the machines. It is particularly interesting to note that the sequence of the sets can be altered at any time, even while the machines are running. By this means any machine can be taken out of its sequence and shut down for examination without interfering in any way with the operation of the sub-station.

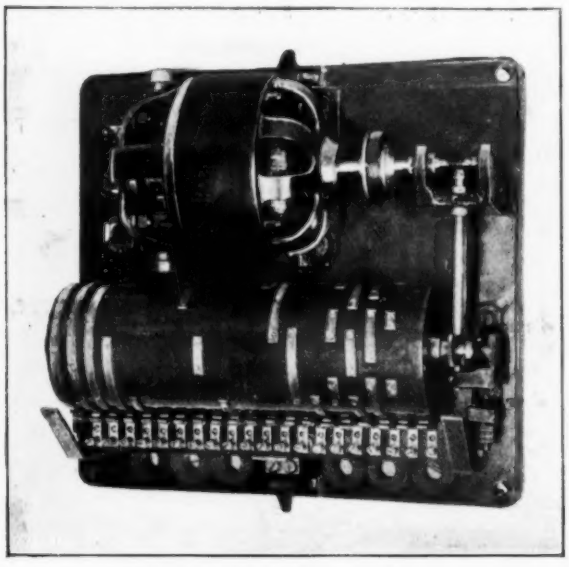


Fig. 4.—Sequence Control Unit.

The apparatus is fully protected, and while the safety of the equipment is assured, interruption of service is reduced to a minimum. If the load exceeds the safe capacity of the machines, current limiting resistors are automatically put in circuit with them so that the load is limited to a safe value, and is shared equally by the machines in operation. Should the overload be prolonged, thermostats operate to cut off the machines until the resistances have cooled, when the rotaries will automatically restart. In the event of any trouble which cannot be automatically cleared, such as the failure of a machine to start or the overheating of the bearings, a lock-out relay operates to put the affected machine or machines out of commission until the station has been visited and the trouble remedied. In the meantime the sequence control gear already described maintains the operation of the other machines without interruption.

Ventilation of the sub-station is effected by means of a fan mounted in an air duct. If the sub-station is under sequence control the fan is automatically started when the first machine starts up, and remains running until the service of the sub-station is no longer required.

An interesting feature of the installation is that provision is made for the remote control of the plant, in the case of emergency, from the company's St. Martin's Lane sub-station. The whole of the equipment was supplied by the Metropolitan-Vickers Electrical Co., to whom we are indebted for the above particulars.

Domestic Refrigeration.

The mild and sometimes humid climatic conditions of this country are highly favourable to putrefactive processes. Hitherto it has been possible to ward off the decay of food by employing preservatives, supplemented by ice during heat waves, but with the New Year the new food regulations of the Ministry of Health will come into force and the use of preservatives will be severely restricted. The householder and the small shopkeeper will then be thrown upon their own resources to a far greater extent than in the past, and in order to avoid serious waste they must have recourse to artificial cooling. In many cases this will mean the use of ice, the cost of which is likely to rise as the demand increases, whilst the supply of ice in this country, which has not indulged freely in its consumption in past times, is both limited and precarious.

Fortunately, with its customary versatility, electricity is prepared to solve the problem most efficiently. Until recent years, it is true, we knew of only one small-sized electrical refrigerator—the Audiffren type, made by Messrs. Brown, Boveri & Co., Ltd.; but in September, 1922, we illustrated a conveniently-planned refrigerator-cupboard, with a complete electric refrigerating set in the base provided with thermostatic control, and made by British Engineering Units, Ltd., of Coventry. Since then there has been a boom in electrical refrigerators, originating in the United States (where, it is said, 600,000 householders have adopted them, and some 60 firms are manufacturing them), and already many thousands have been installed in this country. There is every reason to believe that there will be a large and increasing demand for them, and several companies have undertaken their production and sale. Early in the field was the Delco-Light Company, which introduced the "Frigidaire" household cabinet; this machine, like most of the small refrigerators, works on the mechanical compression principle. Another example is the "Kelvinator," introduced by Messrs. L. G. Hawkins & Co., Ltd. Quite a different system was adopted in the "Electrolux" refrigerator, made by Messrs. Electrolux, Ltd., which possesses no moving parts (except liquids) and is actuated by an electrical heater. We have described the operation of these devices in past issues, and here need only emphasise the important position that electrical refrigeration will occupy in the near future.

On being out of a Job.

By ONE WHO IS.

I used to say to myself each time I made my way along the rather grubby street that led to my working-place, "You know, Percy, ——." I must break in on my unspoken words to explain that my name is not Percy at all; but one may as well think of oneself in the noblest terms, and Percy is a really magnificent name, is it not? Indeed, at the back of my mind there lurks a memory of a tale of a little boy who thought that God himself might not be ashamed to be called Percy —so simple was his childhood's vision! Perhaps it was one of the great truths that are hid from the wise and understanding, but revealed unto babes. Well, I said to myself, "You know, Percy, one day will be the last that you will walk this way; and then what will you do?" The question had no definite answer in my mind; but the effect of its incessant repetition was such that when the last day came and the present state of things caused the fatal scissors to snip and cut me adrift from a long-accustomed berth, I went out into the open sea with a perfectly clear and undisturbed knowledge that the past was useful only so far as it would urge me on to the future that was waiting for me somewhere. What storms may have to be weathered before a port is in sight again will be best met with eyes ahead, not diverted to try to snatch a last glimpse of the old preoccupations that brought so much pleasure in the difficulties and the problems they offered for solution; and if the journey's end is to come after only a short voyage over a calm sea, even then a peaceful mind will be better than anything else to step on shore with. A downcast look does not see the full circle of the wide horizon.

On the morning when I first found myself in the condition that I understand the Directories to refer to when they describe a person as a "gentleman," the postman brought me an unexpected offer of help; was I foolish not to leap to accept it? It was addressed to me from very nearly Mayfair, and came, obviously, from a philanthropist with pockets so bulged out with money that he wanted me to have some of what he could not find room for: anything from £50 to £10,000 was at my disposal, without any security, and available against my mere signature; and my being over 21 years of age seemed to be an advantage. I found the day pass more cheerily because of that beginning.

This new state of life brings a new outlook with it. Formerly, one day might be expected to be very much like another. The probable things to be done to-morrow were never quite unknown; they might involve a sudden journey to the other end of the country, with only enough time to thrust a hand into a drawer and put what came first into a bag, hoping for the best, before rushing to the train; they might mean thinking about people, or machines, or things in general; but they always ran on lines that joined yesterday's lines, and became themselves the beginning of to-morrow's. But now each day is a thing more or less unknown. True, the sun will rise in the east and set in the west; the rather mechanical processes of Nature will go on;

> Slow on your dials the shadows creep,
> So many hours for food and sleep,
> So many hours till study tire,
> So many hours for heart's desire;

the common life will continue, and I shall still be a part of it; but my part is unknown until it has been played. Yet, after all, in the days that we think will succeed each other almost without change, the uncertainty is just as great; the bolt comes out of the blue, when that is its way, quite as easily as from the cloud; it is not every cloud that holds a bolt for us; and even the unexpected event may not be all dull, as when a rich relative (never mine, so far!) dies abroad, and his wealth descends.

I suppose the people I used to see day after day in the little piece of street I went along, and those who caught the same 'bus as I did, are still walking and riding there; but to me they are dim, because I am trying to see the new companions of the future. Some of those who have gone my way, or whose way I have gone, for so long were known to me as friends; some I knew to say "Good-day" to; some by name; and some no more than by sight. The friends remain. There lies the great consolation. Without them nothing would be worth while; with them everything is full of meaning, and I cannot but be glad.

> Let me enjoy the earth no less
> Because the all-enacting might
> That fashioned forth its liveliness
> Had other aims than my delight.

Who can explain the essence of things? What do they mean? Had the "all-enacting might" any aim at all? Do we appear for a moment in a process that uses us a little, and then casts us aside? What does it matter? There is enjoyment, deep, true, and solid, in some of it: let us savour it!

The first number of *Punch* issued after I heard of what was coming for me brought me a poem with a lines in it:—

> There'll still be flowers and birds and bees,
> Octobers still and Junes,
> There'll still be a spring wind through the trees
> And the autumn afternoons;
>
> * * * *
>
> And your own folk and your friends to teach you
> That a man can soon forget
> How life looked black, once the luck comes back
> And a fairer fortune's met.

A friend, whom I suppose I shall never know, had written that. And what of those I do know? It is a testing time for a man's friends as well as for himself when he is between an end and a new beginning; and I know now, with a knowledge that can never be destroyed, that friendship is one of the many diverse elements in the pattern of things. Some ties that might have been thought strong enough to hold have snapped; but in their places others have come that will not give way. Men have opened their minds to me, and have shown me depths that I did not know existed; I have the abiding sense of their hands held out to help, and of their voices asking, "How can we best add our efforts to yours to bring you past this episode?" Is not that a great, a sustaining, an uplifting thing?

Where is the niche that I shall some day fill? And what is it like? What shall I find once more to give me full and satisfying bodily and mental occupation? Is this a time when a peep into the future would be a benefit? Once more, who can tell? What is that which we call the future? Is it all prepared beforehand, like the part of a cinematograph film still to be unrolled? Or may life somehow bubble up and deal with us in ways perhaps unforeseeable even by an all-seeing Creator? (Do not, I beg, ask me to explain that last question; I tell you frankly here and now that I cannot.) Anyhow, time carries us relentlessly along:—

> Onward the chariot of the Untarrying moves;
> Nor day divulges him nor night conceals;
> Thou hear'st the echo of unreturning hooves
> And thunder of irrevocable wheels;

and our real job in it all is to "love the brotherhood: fear God; honour the King."

Electric Light Fittings for the Home.

In the following notes we have brought together particulars and illustrations indicating some of the activities of manufacturers in introducing to the market fittings of suitable design for service in providing electrical illumination for the home.

A number of new lines of domestic electric lighting fittings for the present season have been introduced by Messrs. Metro-Vick Supplies, Ltd., Trafford Park, Manchester. These are additional to their line of high-class Harcourt fittings, designed by Mr. Walter Gilbert, the well-known sculptor, and constantly being made to suit all styles and periods. The new departures include an attractive class of ceiling fittings and brackets in a white enamelled finish, particularly suitable for the nursery, bathroom, kitchen, and passages. White enamelled fittings of this kind have been very popular in the United States recently, but they have not had the same vogue in this country. They include totally-enclosed fittings, such as the "Steane" and "Seefin" and popular designs of brackets such as the "Ancroft." Another new speciality is three-ply glassware marketed under the name "Silverstone." This is supplied either decorated or self-coloured in various forms, *i.e.*, for shades, bowls, and for totally-enclosed units. The "Swanmore" and "Silloth" fittings are two typical and attractive examples. We illustrate in fig. 2 the "Seefin" ceiling fitting, spun mount, which is finished in white enamel or natural bronze as desired. It is made in various sizes to take "Silverstone" glassware. Fig. 8 represents a "Silloth" single-light pendant (overall length 48 in.), with cast ornamental and perforated mount; this is finished in either dead gold, natural bronze, or oxydised silver. It carries rich art-coloured "Silverstone" glassware. The company has recently issued to the trade a fully descriptive catalogue, in colour, of these goods. A variety of designs of totally-enclosed commercial class fittings is being produced, the "Sarsden" and "Sphinx" being two examples in this class. The company not long ago opened large showrooms at 155, Charing Cross Road, London, where large stocks of Metro-Vick fittings are on view. Special books of introductory tickets are supplied to the trade on request, for their convenience in sending customers to make selections.

Fig. 1.—A Ceiling Fitting.

Fig. 2.—The "Seefin" Ceiling Fitting.

Messrs. Best & Lloyd, Ltd., of Cambray Works, Wattville Road, Handsworth, Birmingham, have produced a range of "Best" lighting fittings of an inexpensive class to meet the demand which exists amongst a large part of the population for cheaper fittings of sound design, but simply and strongly made. These are particularised in Catalogue No. 142, recently issued to the trade, and they include sliding pendants with silk shades, chain pendants with glass shades, candle brackets, bowl fittings, hall lantern types, a range of pendants with decorated "Pearlite" globes, and silk-shaded standards. Our illustrations show a bathroom bracket, white enamelled, with a plate "Pearlite" globe (fig. 11); an example of bowl fitting with "Pearl" etched bowl with tinted decoration (fig. 7); and a pendant with quick-grip carrier and 7-in. "Radiolux" bowl (fig. 16).

The Siemens & English Electric Lamp Co., Ltd., has prepared several lists for the trade, in which fittings and glassware for household electric lighting are particularised, illustrated, and priced. No. 156 is devoted to "Silvaray" fittings provided alternatively with plain or decorated glassware. This range of enclosed fittings has been specially developed to cater for the needs of modern commercial lighting installations, but the two examples of ceiling canopy type, shown in figs. 3 and 4, are particularly suited for use as kitchen units. The "Silvaray" glassware is specially manufactured from 3-ply glass, and has a high efficiency. In the decorative types the design is etched in golden brown. There is a rapidly-increasing demand for enclosed-type fittings, due to the efficiency that they possess with a minimum expenditure for upkeep. A variety of chain pendant fittings of the "Silvaray" class is also shown in this list. Pamphlet No. 158 is printed in colour, and shows decorative lighting units primarily introduced for use in the home. It is claimed that the soft tints employed permit of an even diffusion of warm light that will harmonise with practically any scheme of decoration. We illustrate in fig. 14 one example in the decorative unit class. The trade is probably aware that the company issued a catalogue (No. 150) in June last showing representative types of other "Siemens" lighting fittings—brackets, lanterns, electroliers, silk shades, pendants, table and floor standards, &c. Any of their designs may be inspected at the showrooms at 38-39, Upper Thames Street, E.C.4.

Figs. 3 and 4.—"Silvaray" Kitchen Units.

For some time past the manufacturers have been endeavouring to popularise in this country what is known in the United States as the "kitchen lighting unit." This hygienic dustproof type of fitting is, no doubt, considered at present far too good for the average kitchen, but we believe that it is making rapid headway. An example of this class of fitting is the "Trojanette" (British Thomson-Houston Co., Ltd.), illustrated in fig. 13. It consists of an opal glass shade fitted into a white enamelled canopy, and it also has a separate pendant with a switch socket for an iron or other device

We have previously referred to the "Eye-Restolite" fitting supplied by the same company, but we think it worth while to mention it again, as it employs a principle which is uncommon. It consists essentially of an "X-Ray" reflector above and a diffusing bowl below, a gasfilled lamp being held between the two. The major portion of the light is reflected upwards to the ceiling, while a soft diffused light is provided in a downward direction. This diffused light also serves to

Fig. 5.—The "Eye-Restolite."

Fig. 6.—An Ackroyd & Best Standard.

illuminate the silk shade, which is supported on a self-adjusting carrier inside the diffuser and reflector (see fig. 5).

Fig. 9 is an example of the semi-indirect lighting pendants employing opal glass, which are supplied by the B.T.-H. Co.

A wide range of fittings equipped with "Bencolite" glassware is supplied by the Benjamin Electric, Ltd. A typical example is illustrated in fig. 10. This is a totally-enclosed unit with a special glass bowl of distinctive contour. The metal canopy is usually given a satin-brass finish, but several other finishes are available. A useful adjunct to this and other lighting fittings is the "Dim-a-Lite" adaptor (fig. 12). Operated by pull chains, this rheostatic device gives five positions, *viz.*, full, half, dim, "nightlight," and out.

Glassware is a speciality of Messrs. Ackroyd & Best, Ltd., and consequently they are in a position to provide lighting fittings of multitudinous designs. Many of these are to be seen in London, for the company has recently opened large showrooms and stores at Mansell Street, near the Tower of London. They have recently sent us a comprehensive catalogue of lighting glassware, from which we have chosen the following examples. The first (fig. 6) is a table standard in metal, 24 in. high, equipped with an opal glass shade bearing a plain design in relief. The shade has a diameter of 14 in. Fig. 15 depicts a semi-bowl fitting for affixing to a wall. If required, further support can be afforded by a chain to the centre of the front.

Fig. 7.—A Best & Lloyd Bowl Fitting.

Fig. 8.—A "Silloth" Single-light Pendant.

Fig. 9.—A Totally-enclosed Pendant Fitting.

Fig. 10.—A "Bencolite" Unit.

Fig. 11.—A Best & Lloyd Bathroom Bracket.

Fig. 12.—The "Dim-a-Lite" Adaptor.

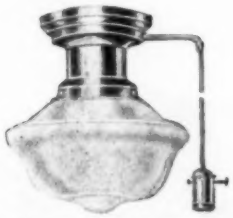


Fig. 13.—The "Trojanette" Fitting.

Fig. 14.—A "Siemens" Bowl Fitting.

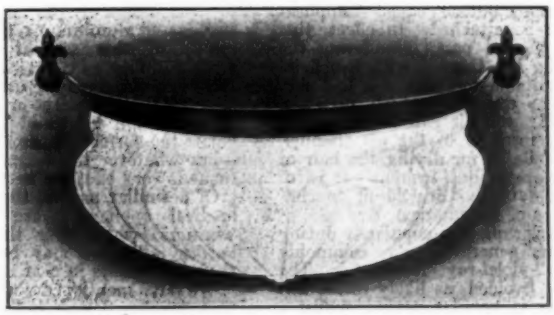


Fig. 15.—A Half-Bowl Fitting.

Fig. 16.—A "Radiolux" Bowl.

A totally-enclosed bowl of unusual shape is shown in fig. 1. This is "Hailglass-ware," designed to fit close to a ceiling.

Messrs. William McGeoch & Co., Ltd., are an old-established concern, and were pioneers in the manufacture of electric lighting fittings. Some time ago they started up a domestic lighting branch, and this has developed rapidly. Their new catalogue presents many handsome fittings, a speciality being "period" designs. The company has showrooms in Glasgow and Newcastle-on-Tyne and a works at Birmingham.

Electromedical Apparatus for Domestic Use.

Some Devices which can be Safely Used in the Home.

The use of electricity—and "magnetism"!—for curative purposes has exercised a singular fascination on the popular mind since the earliest days, and the very name has in the past, unfortunately, been employed by unscrupulous quacks as a lever to extract large sums from the pockets of a credulous public. The most notorious instance of this kind of fraud was the Harness electric belt, the exposure of which in 1893 involved the Electrical Review in several costly libel suits, but effectively checked the craze for squandering good money on worthless so-called remedies.

Since those days vast strides have been made in the development of electro-therapeutics, which is now recognised as one of the most valuable curative agencies known to medical science; no better proof of this statement could be sought than the recent inauguration at the Royal Infirmary, Edinburgh, of new buildings and plant for electromedical treatment which cost over £50,000 (Electrical Review, October 15th, 1926, p. 628). In the hands of professional experts, electrical methods have yielded extraordinary results, and have conferred inestimable benefits upon sufferers from many ailments.

But a grave warning is necessary to those who may be tempted to embark upon self-treatment by electrical means. The use of electric baths, X-rays, ultra-violet light rays, and similar powerful agencies by the inexpert is extremely dangerous and should on no account be ventured on. The devices to which we refer in the following notes do not fall within this category, and may be employed in the home with safety, subject to one important restriction: whilst no danger attends their use in bedrooms and living rooms from which earthed conductors, gas and water pipes, &c., are absent, portable appliances must never be used in the bath-room, kitchen, or other place where earthed metal is exposed, lest through some chance derangement of the appliances a severe, or even fatal, shock should result.

Fig. 1.—High-Frequency Generator and Electrode.

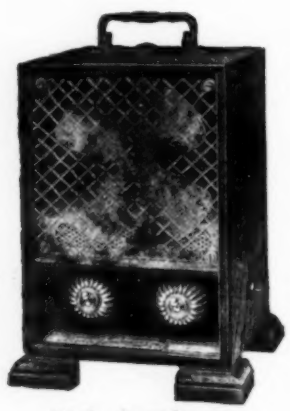


Fig. 2.—Ozone Generator.

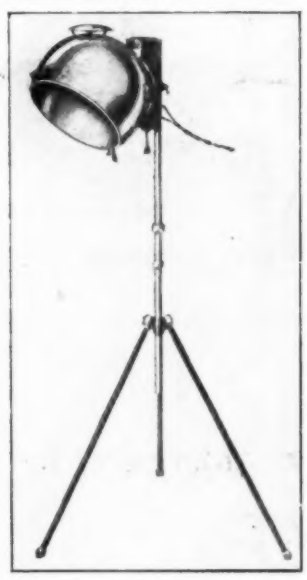


Fig. 3.—Ultra-Violet Carbon Arc Lamp.

One of the safest appliances, which also covers a wide range of uses, is the electric vibrator. This comprises a miniature motor mounted on a handle, and provided with a rapidly-vibrating spindle, to which various button-shaped "applicators" of rubber or ebonite can be attached. In effect, this device applies massage to the affected part, stimulating the action of the skin, and kneading the tissues, with beneficial effects. The motor is usually suitable for both a.c. and d.c.

Similarly, small motor-fans are available which direct a current of air through a nozzle; the air can be heated, if desired, by an electrical heater inserted in the air channel, and thus the appliance is very suitable for drying the hair of ladies who have not adopted the prevailing fashion. It is, of course, equally serviceable for applying hot or cold air douches to the body, and is used in cases of rheumatism, &c.

A type of apparatus which has sprung into popularity during recent years is the high-frequency generator, more commonly but less correctly known as the "violet-ray" apparatus. The use of the latter term should be avoided, as likely to be confused with ultra-violet light rays in popular usage; whilst a violet discharge is produced in a vacuum tube, this is merely incidental to the real operation of the apparatus, which generates high-frequency currents by means of an induction coil and condenser, at a pressure which may be as high as 40,000 volts, though the current is a fraction of a milliampere. The h.f. current is applied to the body by means of glass vacuum tubes of a great variety of shapes; the discharge takes place entirely inside the tube, inducing by condenser action corresponding oscillatory h.f. currents in the substance of the flesh. At high frequency such currents produce no sensation, except that of warmth—though if the vacuous bulb is held near, but not in actual contact with, the skin, sparks pass between the surfaces which are by no means unfelt! It is claimed that high-frequency treatment is very beneficial in cases of rheumatism, neuritis, insomnia, and a variety of eye, ear, and throat troubles. The generator is provided with means to regulate the intensity of the discharge, and is suitable for both a.c. and d.c.; with the rest of the apparatus it is usually contained in a neat portable box. Fig. 1 shows the pattern made by Messrs. I. Calvete, Ltd., for home use.

When the h.f. apparatus is in operation, the odour of ozone, due to the electrical discharge, is plainly smelt, and small apparatus are made for the express purpose of producing ozone for inhalation. This gas, however, is more generally "broadcast," so to say, and for this purpose ozone generators are employed. One of these, made by Messrs. Ozonair, Ltd., and designed for use in private houses, small offices, &c., is shown in fig. 2. It consists of a generator producing ozone by the action of a silent electric discharge, without contamination with oxides of nitrogen, together with an electric fan to disseminate the gas, and a gauze filter for the incoming air, the whole being enclosed in a polished wooden case. The consumption of power is only 20 watts. Ozone efficiently neutralises unpleasant odours and drives away flies, besides which it is of service in the treatment of diseases of the respiratory organs, and in purifying the air of sick rooms. Its powerful oxidising properties render it an effective sanitary agent; it has a marked freshening effect upon the air of rooms.

A form of radiant light and heat treatment of very long standing and of good repute is that which employs an "electric light bath." This consists essentially of a number of incandescent lamps arranged on the interior of a casing or frame-work, which may take a variety of shapes, to enclose a limb, say, or the whole of the body up to the neck. A modern design, due to Messrs. Schall & Son, Ltd., consists of two curved aluminium reflectors mounted in a wood frame and hinged together, so that the whole thing can be folded up for portability and carried by a handle. Twelve 60-watt carbon-filament lamps are used, on two circuits, so arranged that whether 6 or 12 lamps are in use the distribution is uniform. Probably the light and heat waves penetrate more deeply below the surface of the skin than heat applied by conduction—but whatever the reason, there is no doubt that this treatment is very effective in rheumatic and similar cases.

Of a similar nature, though hardly to be classed as electromedical appliances, are electrical foot-warmers and bed-warmers, which have the great advantage over hot-water bottles that they stay hot as long as desired. In hospitals their use results in a great saving of labour.

We have mentioned above, amongst the modes of treatment that involve danger unless conducted under medical supervision, the use of ultra-violet rays. When these are produced by tungsten arc lamps or mercury-vapour lamps, which are peculiarly rich in such rays, our warning holds good. The carbon arc, however, whose spectrum approximates to that of natural sunlight, may safely be used for irradiation, with discretion. The apparatus illustrated in fig. 3 is an arc lamp for this purpose, made by Messrs. Schall & Son, Ltd. The lamp is automatic, and works on a.c. or d.c. The carbons used are specially impregnated with nickel salts, which produce ultra-violet rays in proportions similar to those of sunlight and of the same wave-lengths. A 6-ampere arc of this description, at a reasonable distance from the body, can safely be used for exposures up to as long as half-an-hour without injury to the skin. The remarkable virtues of sunlight, natural or artificial, have recently been abundantly demonstrated, and light treatment is now practised on a large scale.

American Cable Practice.

Some Impressions of a Visit to the United States.

ON October 14th Capt. P. Dunsheath, chief of the Research Department of Messrs. W. T. Henley's Telegraph Works Co., Ltd., gave a lecture at Australia House, Strand, London, dealing with his recent American tour, during which he attended the Convention of the International Electrotechnical Commission in New York, as a representative of the British Cable Makers' Association, and made many visits to cable manufacturers and supply undertakings on behalf of his firm. The lecture was illustrated with a number of lantern views of American features of general interest, and by a film, "Power," which depicted in a pleasing and ingenious manner the development of the power supply in the States. Capt. Dunsheath's programme also included his participation in the Convention of the American Institute of Electrical Engineers, at Madison, Wisconsin, and also in the Convention of the National Electric Light Association at Atlantic City. The lecturer's general impressions of America were very interesting, but we can deal only with the electrical side.

It is interesting to learn that the mileage of liftway in the New York skyscrapers is greater than the combined mileage of underground tramway and railway track in the same area. One of the interesting features seen in New York was the "Great White Way" (Broadway), where the aggregate candle power of the illuminated sky signs is over 25 millions. The I.E.C. members were amused on the second day of their visit to see themselves described in the American papers as "Electrical stars" and "Electrical geniuses." From the lecture we learn that:—

The most interesting development in high-voltage cable work in the United States is the installation of two systems to work at 132,000 V, one in New York and one in Chicago (ELECTRICAL REVIEW, February 26th, 1926, page 349). The cable conductor is made with a hollow centre which is kept filled with a fluid oil during service. The New York Edison Co., working in conjunction with the United Electric Co., is laying about 11 miles of this type of cable from Hell Gate to the northern outskirts of the city. The cable is drawn into concrete ducts and at intervals along its length special barrier joints are inserted, into which oil under pressure will be kept supplied. The Chicago installation is on very similar lines for a six-mile run; in both cases the conductor section is 600,000 circ. mils. In New York, the city fire-fighting plant will be dependent on these cables, and any failure of them will involve the New York Edison Co. in a penalty of $400 for every minute during which the electricity supply is off. The New York cables are dependent for their oil feed on a few inches of head carried by a pipe up a sloping side, while in Chicago special buildings are being erected to carry the oil tanks on the roofs, the lower part of each being let as a garage. The cables are being made jointly by the General Electric Co., America, and Messrs. Pirelli-General.

Apart from these 132,000-V cables there are a number of installations at 44 and 66 kV. In New York there is an 11-mile run of single-core 500,000-circ. mil. cable, made up of two sets of cables by different makers, one, with ½-in. dielectric, has been in satisfactory operation for about two years, but the other, with a greater thickness, has failed so frequently that it has had to be entirely replaced. In Philadelphia there is a run of three or four miles of 40,000-V single-core cable, while in Cleveland is an 8-mile run of 66-kV underground transmission, also of single-core cables. The same size of conductor, 500,000-circ. mil, is also employed there, with about 1-in. dielectric. Several makers have supplied parts of this installation, and it is curious that, while some have had perfect operation on their cables, but joint troubles, others have had no breakdowns on their joints, but frequent cable failures. American experience with 33,000-V cables is rather a sad history; there are several hundred miles of 33,000-V cable laid in the United States, but only a small proportion of it is in operation at that pressure. In most cases it has been necessary to reduce the voltage in order to keep the cables working.

The general tendency of American practice on power cables, as compared with the practice in this country, is to use higher voltages, hollow conductors for very high, and shaped conductors for high pressures; to run unarmoured cables in ducts, rather than armoured cables direct in the ground; to use higher current ratings than are common here; to abstain from standardisation of low-voltage cables; and to use extensively cables for overhead distribution, and varnished cambric cable.

In referring to telephone cables, Capt. Dunsheath said he had no difficulty in conversing right across America with a young lady on the other side, and in deciding that she was Irish. At a dinner given by the American Cable Engineers, at which the lecturer was the honoured guest, he was gratified to see in what high opinion British cables, and those who produce them, were held in the States.

At Chicago he saw one of the new steam turbine sets recently made and installed by a British firm, and a 35,000-V cable which was made at Gravesend.

Among other interesting features of the tour were visits to the Lynn works of the General Electric Co., where he spent a very useful time in the research and development laboratories under the personal guidance of Professor Elihu Thomson, and to the electrical laboratories of the Harvard University and the Massachusetts Institute of Technology.

In the G.E.C. cable factory, special vacuum pumps, of a type usually looked upon in this country as scientific toys, are in daily use on routine production, and very complete acceptance tests are also being carried out on the raw materials used in the manufacture of cables. Everywhere in the factory he found research men co-operating with the production staff.

One attractive invitation which Capt. Dunsheath accepted was to visit the electrical testing laboratories at New York. This organisation is a co-operative laboratory in which is carried out testing work for the supply companies. Both there, and in the Brooklyn Edison Co., the American cable user is giving the maker a more strenuous time than is the case in this country.

On the theoretical side of cable manufacture there is wide divergence of opinion among American engineers on matters of detail. On the question of the various stress theories some are still inclined to favour the use of the maximum stress as determined by the logarithmic formula, while others have definitely come out in favour of the average stress.

Both makers and users are very much alive to the development of that curious substance ("cheese" or "substance x") which is found in high-voltage cables after a few months or years of service. In some of the large laboratories, elaborate testing arrangements are now installed for testing compounds with a view to determining their liability to the formation of this substance. It seems to be definitely established that the cable compounds which give the low values of dielectric loss are those which are unstable and form this "cheese" most readily. On the question of the relative merits of Manila and wood-pulp paper, although American cable makers were unanimous in favour of Manila for many years, most of them are definitely of the opinion that wood-pulp paper, if properly selected, produces the most satisfactory cable.

The Pacific Cable Board.

The Annual Report and Accounts for 1925-26.

THE annual report of the Pacific Cable Board covers the period from April 1st, 1925, to March 31st, 1926, and shows that the receipts for the year (£458,758) exceeded the ordinary working expenses (including the normal payment of £30,000 to the reserve and renewal fund) by £149,770. After taking account of the annuity of £77,544 payable to the National Debt Commissioners in respect of interest and repayment of capital, and the annuity of £2,081 payable to the reserve and renewal fund in respect of repayment of money borrowed from that fund for the Sydney-Auckland cable (1912), a surplus of £70,144 remained, the whole of which has been devoted to the reserve and renewal fund, the resources of which would not, without this special contribution, be adequate for meeting the expenditure on duplicate cables.

The traffic receipts (£453,598) were less by £81,416 than those of the previous year, due partly to the loss of a substantial portion of the United States business owing to a new arrangement between one of the American landline companies and the Eastern group of companies, which resulted in the transmission *via* Europe of much traffic which had hitherto been transferred to the Board; and partly to rate reductions which, although introduced during the latter part of the previous year (*viz.*, on December 1st, 1924) did not show full effect until the year under review.

The expenditure (excluding the contributions to the reserve and renewal fund) was higher by £13,658 than that of the preceding year; the increase was accounted for by higher staff costs, by the provision of additional residential accommodation at Bamfield, the extension of the office building at Fanning Island rendered necessary by the duplication of the cable, the provision of new apparatus, &c.

The total assets of the reserve and renewal fund on March 31st, 1926, amounted to £2,313,971, and included stock cable to the value of £91,587. Withdrawals from the fund during the year under review in connection with the duplication of the cables between Vancouver Island and Fiji amounted to £165,536. The balance of the expenditure on providing and equipping these new cables will amount to approximately £2,214,000, and has to be met during the year 1926-27. The total cost of duplicating the cables (including the sections south of Fiji duplicated in 1923) will be approximately £2,720,000.

The cable between Norfolk Island and Auckland was interrupted on two occasions during May and June, but did not involve any inconvenience to traffic; the cable between Bamfield and Victoria became faulty in December; other cables were maintained without interruption.

Various circumstances have delayed the progress of the duplication contracts, but it is expected that both the new sections will be completed before the end of November, 1926. The contractor for the Bamfield-Fanning Island section (the Telegraph Construction and Maintenance Co.), has found it necessary to build a new cable steamer primarily for the purpose of transporting and laying the Board's cable, which is the longest uninterrupted stretch in the world (nearly 3,500 n.m.), and it is interesting to recall that when the first cable was laid on this section (by the same Company in 1902) it was necessary to build a steamer for the purpose (C.S. *Colonia* 8,000 tons), then the largest cable steamer, but the new cable although the same length, is loaded with a continuous winding

of a non-magnetic alloy, which increases the girth and weight of the cable. The new *Dominia* has a gross tonnage of 9,250 tons, is an oil burner, and can carry sufficient fuel to give her a steaming range nearly double that of the *Colonia*. The cable-maintenance vessel *Isis* remains in first-class condition.

The landlines leased by the Board from the Canadian Pacific Railway worked well during the year, but the service on the Australian landline between Melbourne and Sydney, which is allocated by the Commonwealth Government for the exclusive use of the Board, still leaves much to be desired owing to frequent interference resulting from reconstruction work, but the Board hopes that this work will be completed in the early future. The telegraph system (cable and wireless) in the British West Indies and British Guiana, which is managed by the Board for the Imperial and Colonial Governments, partners in the scheme, has been maintained with efficiency and the volume of business handled has exceeded anticipations.

No changes in the membership of the Board took place during the year under review. Since the close of the year the Board sustained a loss by the death of the Hon. Sir Timothy A. Coghlan, K.C.M.G., I.S.O., who had been a member of the Board since 1906. Sir Campbell Stuart, accompanied by Mr. J. D. Brown, the Board's traffic accountant, visited the West Indies and British Guiana during the year and carried out a comprehensive inspection of the telegraph system administered by the Board. Sir Campbell Stuart submitted suggestions which have been carried into effect.

The post of manager in the Pacific, rendered vacant by the retirement of Mr. John Milward in 1924, was filled by the appointment in February, 1926, of Mr. Percy Hunter, who had been Director of Immigration to the Commonwealth Government. Mr. R. I. S. Bain, the Board's senior superintendent, who acted as manager in the Pacific from the time of Mr. Milward's retirement until the appointment of Mr. Hunter, has been appointed to the newly-created post of general superintendent of the cable system with headquarters at Sydney, and he is the manager's adviser on technical matters.

To meet the need for increased staff the Board has established a training centre at the Bamfield station, where lads recruited in Canada will be trained as operators. The number in training at the close of the year under review was five, which number will be extended to 12 as soon as sufficient accommodation is available. The scales of pay for clerical officers were improved during the year under review.

During the year approximately 11,900,000 paying words of International traffic (*i.e.*, other than local messages between Australia, New Zealand, and the Pacific Islands) were transmitted across the Board's system; this volume was practically the same as that of the previous year. The ordinary or full-rate International traffic showed a falling off of approximately 570,000 words as a result of the arrangements, referred to above, for the transmission *via* Europe of United States' business. There was an increase of 38,000 words in the deferred ordinary International traffic, of 37,000 words Government, 262,000 words daily letter telegrams, and 279,000 words week-end telegrams. The Press traffic was of approximately the same volume as during the previous year.

In addition to the International traffic, approximately 3,451,000 paying words were carried between Australia and New Zealand, and between those Dominions and the Pacific Islands, approximately 765,000 words more than during the previous year. Ordinary local traffic was less by 78,000 words, while the night letter telegrams produced 1,649,000 words (781,000 higher than during last year) and Press traffic showed an increase of 50,000 words.

In deference to representations by the Empire Press Union, the Press rate between the British Isles and Australia or New Zealand was reduced from 7½d. to 6d. per word in July, 1925, and the Press rate between Canada and Australia or New Zealand, from 5d. to 3½d. in the following month.

Electric Battery Vehicles at Warrington.

Some Results of Two Years' Service of "Orwell" Lorries.

The manager of the Corporation's Cleansing Department, County Borough of Warrington, has issued a report of considerable interest on the operation of electric battery-driven vehicles engaged in the collection of night soil.

Mr. Charles Parfitt, cleansing superintendent, expresses himself as being greatly pleased with the performance of the vehicles, as they have fulfilled the duties required of them admirably. We are informed by Mr. F. V. L. Mathias, M.I.E.E., borough electrical and tramway manager, Warrington, to whom we are indebted for a copy of the report, that the electricity employed for charging the batteries of the vehicles is purchased from the Corporation Electricity Department at a "restricted hour rate" of 1d. per kWh.

The five vehicles concerned are of the "Orwell" type (Messrs. Ransomes, Sims & Jefferies, Ltd.). They successfully completed their second year's service on July 10th, 1926, and have done remarkably well; no serious stoppage of work occurred during the year beyond that occasioned by minor trouble, such as broken springs, chains coming off, &c., which, whilst not proving serious, affected slight delay occasionally and resulted in the loss of a load or two, the latter having to be brought in during the same night by the first vehicle to finish. The following Table I shows the number of loads carted and the mileage run per vehicle during the past 12 months:—

Table I.

Vehicle.	Loads.	Miles.
No. 1	2,010	3,828
No. 2	2,011	3,517
No. 3	2,013	3,675
No. 4	2,010	3,737
No. 5	2,005	3,715
Total	10,049	18,472

The total amount of electricity consumed from July 11th, 1925, to July 10th, 1926, equalled 37,155 kWh.

The cost of electricity per mile run equalled 2.011d.

Only one battery cell out of the total of 200 in use has been changed by the manufacturers in accordance with their guarantee. The batteries, upon whose service the transport system is entirely dependent, show little sign of depreciation as yet; from all appearances, and, according to the Chloride Electrical Storage Co.'s inspector's report, they are likely to serve for another 12 months before the operation of thoroughly cleaning out the cells becomes necessary. This work will naturally take up some time, because each cell will have to be opened, the plates taken out, and the cell thoroughly cleansed of all deposit.

It is generally acknowledged by all users of electric vehicles that the batteries throw off deposit and depreciate more quickly after their first overhaul, but, assuming three years' service is obtainable from the batteries before the above-mentioned cleansing operation becomes necessary, Mr. Parfitt feels confident that he can look forward to a further 12 months' service before their life can be said to have come to an end.

One of the most important factors in the preservation of the life of an electric battery is the method of charging it; judging by the excellent results of the operation of the vehicles to date, the Cleansing Committee took a very wise step when it sent Mr. J. Dooley, the charge hand under whose supervision the charging of the batteries has been mainly carried out, to undergo special instruction in this work.

Having regard to the nature of the material the vehicles are carting daily and the fact that they have to traverse all passages, both paved and unpaved, within the borough, Mr. Parfitt feels sure the Committee will agree that such service is very satisfactory for lead batteries.

Portable X-ray Equipment.—The Research Department, Woolwich Arsenal, has issued R.D. Report No. 68 on the above subject (H.M. Stationery Office, price 1s. 6d. net). In his introduction, Mr. V. E. Pullin, Director of Radiological Research, explains that in order that X-rays might be of value in certain branches of aeronautical investigation it was necessary to consider the design of an installation which (as the set was required for use in a factory) should be robust and completely safe both as regards X-ray and electrical dangers. The set had also to be portable and of such a shape that it would be capable of passing under aeroplane wings; the last condition postulated a flat top to allow the X-ray tube to be brought comparatively close to the specimen in order that no great loss of X-ray intensity should occur. The X-ray output demanded by the work is high, but of only moderate hardness, or penetrating power. An important condition was that the set should be capable of more or less continuous running. Mr. L. G. Hunt Sarsfield, M.Sc., A.M.I.E.E., A.Inst.P., was responsible for the work embodied in the report. The equipment comprises: (i) a 200-V d.c. motor connected direct to a 3.75-kW, 250-V, single-phase alternator with iron-clad switchgear mounted on a common base plate, which is carried on a turntable truck (3 ft. 6 in. long and 2 ft. 6 in. wide); (ii) an agle-iron structure (4 ft. 8 in. high) on which is mounted the transformer control board; and (iii) a steel tank on wheels (3 ft. by 2 ft. 4 in. by 2 ft. 7¼ in. high) containing the main X-ray transformer, rectifying and X-ray tubes and their filament-heating transformers, all oil-immersed. The voltage across the secondary winding of the main transformer at 10 mA is 112 kV peak, *i.e.*, approximately 80 kV r.m.s. (7-in. needle-point spark gap) and corresponds with 215 volts r.m.s. on the primary winding. Both photographic and screen methods of examination may be used, and with a view to safety, the frames and tank of the respective units can be connected together and to the d.c. earth wire; all high-voltage points are totally enclosed and each pole of the low-voltage a.c. supply is earthed through a lamp as a precaution against any abnormal voltage rise. Except immediately above the tubes where "Paxolin" disks are fitted and at the terminal board, the whole tank is lined with metallic lead 2 mm. thick; over the "Paxolin" disk above the rectifying tube a protective sheet of lead is fitted to the under surface of the tank lid cover plate; over the "Paxolin" disk above the X-ray tube shutters operate and, when fully closed, they afford complete protection. The fluorescent screen is provided with a lead-glass cover which considerably reduces the amount of rays passing into the air; this, however, is not regarded as adequate protection, particularly for long periods. A viewing box with an oblique mirror is used for screen working, in order that the operator may employ indirect methods of inspection.

Business Notes.

Commercial and Industrial Developments, Business Changes, Trade Opportunities, New Publicity Literature, Liquidations and Failures.

Lighting Service at Glasgow.—The Scottish Electric Lighting Service Bureau opened its season on October 13th, when the first of a series of fortnightly lectures was given by Mr. W. S. Jones. Mr. S. B. Langlands, chairman of the Bureau, presided over a large attendance, and explained that it had been considered better to arrange fortnightly lectures instead of having a course such as they had last season. The subject of the next lecture (on October 27th) is "Simplified Methods of Designing Illumination Schemes."

Aluminium.—It is reported in German circles dominating the production of aluminium in that country that since the collapse of the pre-war international syndicate it has become customary for representatives of the various countries concerned to meet occasionally to discuss the situation of the market. But no negotiations have taken place with a view to the re-establishment of the former syndicate, the revival of which is not at present to be reckoned with.

Reparation Deliveries to France.—It was reported from Berlin on October 12th, that Dr. Franck, general director of the Siemens and Halske Company, was then in Paris, after having participated in the deliberations of the committee of the International Chamber of Commerce on the unification of international telephone systems. In certain Berlin circles the continued presence in Paris of the general director was stated to be connected with the great reparation plans of M. Aron, director of the commission on deliveries in kind associated with the French Foreign Office. These plans were said to aim at the acquisition on reparation account of central station and telephone plant and railway material, in connection with which much low-pressure material would be needed.

Proposed Electrical Cartel.—The Paris correspondent of the *Financial Times* says that according to statements from Berlin, an all-powerful Franco-German electrical combine is now being planned, the prime mover in which is said to be M. Loucheur. It is asserted that the formation of this combine has been rendered necessary by the exigencies of French electrical industrialists in connection with the enormous payments in kind which have to be made next year to France by the German electrical industries as the outcome of reparation payments and of the Dawes arrangement. These payments in kind are to be made use of for the general electrification of France which is now proceeding apace. As is natural, French electrical industries demand a substantial share in all Government and railroad electrification works, and fear that these German payments will deprive them of large contracts. A pooling arrangement is therefore in contemplation in which all profits will be shared in stipulated proportions between the French and the German electrical firms. It is said to be possible that, subject to certain reservations, the British and Belgian electrical industries may join in the cartel.

Conditions in Egypt.—A report upon the economic and financial situation of Egypt by Mr. E. Homan Mulock, Commercial Secretary at Cairo, has been published by the Stationery Office (1s. 6d. net). This is dated June, 1926, and indicates that the prosperity of Egypt was enhanced during the past year, and that the Government was pursuing an enlightened course in the development of the country. There was a considerable improvement in the engineering business in 1925, and the British share of imports remained at about 43 per cent. The total value of imported electrical machinery and parts was £E165,354; the United Kingdom's share was only £E30,526, whereas France supplied £E51,824. Germany's share was valued at £E28,628. British firms were successful in obtaining some fairly important Government contracts for electric power installations. German competition in public works contracts for power plant and other electrical equipment fell away during 1925. American firms secured orders for tramway equipment, but the majority went to Belgium. United Kingdom imports of stationary i.c. engines increased appreciably, but French, German, and Swiss competition was increasingly strong. This country again doubled its supply of power pumps in the face of strong competition. The total value of imported telegraph and telephone materials was £E121,227, of which the United Kingdom supplied £E92,429, against £E22,368 supplied by Switzerland, the principal competitor. An appendix to the report sets out in detail a decree governing the regulation of radio-communication. This, broadly, prohibits the establishment of receiving or transmitting apparatus except by licence from the Government. It also compels makers and importers of apparatus to keep a record of purchasers or transferees.

The First E.D.A. Conference.—The paper read by Mr. V. W. Dale at the first E.D.A. Conference of the season (on October 15th) is abstracted elsewhere in this issue. Pressure upon our space compels us to hold over the report of the discussion until next week. We may say, however, that the following speakers contributed:—The Chairman (Mr. H. J. Miles, M.I.E.E.), Mr. C. W. Sully (Director of E.L.M.A.), Mr. Oldham, Mr. C. Hayes, Mr. L. Gaster, Mr. H. F. Simon, Mr. J. W. Beauchamp (Director and Secretary, E.D.A.), Mr. Ellersdale, Mr. W. E. Bush (manager of the Lighting Service Bureaux), Mr. J. Edgar (South Shields), and Mr. E. J. Riley.

Ediswan Lighting Campaign.—In the winter lighting campaign which is being undertaken by the Edison Swan Electric Co., Ltd. (in common with other lamp manufacturers), the dominant figure is a representation of a nurse, which is being produced in various sizes for use of retailers. The lady also appears on a great deal of the company's publicity matter.

Our Foreign Trade.—The following were the values of imports and exports of electrical goods and machinery during September:—

	September, 1926.	Inc. or dec.	9 months, 1926.
Imports.—	£	£	£
Electrical goods and apparatus	335,340	− 751	− 417,662
Machinery	894,391	+ 36,641	+ 493,852
(Electrical machinery)	70,633	− 26,569	− 13,557
Exports.—			
Electrical goods and apparatus	1,638,598	+478,624	− 59,350
Machinery	3,445,979	−513,172	−2,664,026
(Electrical machinery)	445,596	+ 69,327	− 154,948
Re-exports.—			
Electrical goods and apparatus	14,347	+ 2,923	− 49,208
Machinery	6,357	+ 33,879	− 129,455
(Electrical machinery)	6,357	+ 1,985	+ 17,665

The New Metro-Vick House, Glasgow.—Since publishing the note on the new Glasgow premises of the Metropolitan-Vickers Electrical Co., Ltd., and Metro-Vick Supplies, Ltd., in our last issue, we have received further photographs of Metro-Vick House. One of them, depicting a part of the showroom, is reproduced herewith. It will be seen that the

The Showroom at Metro-Vick House, Glasgow.

apartment is tastefully decorated and furnished, while the electrical appliances are shown in the correct manner, *i.e.*, there are a few of them instead of an agglomeration which would be apt to overload the visitor's mind.

On October 13th, a party of about a hundred members of the Electrical Association for Women paid a visit to the new premises. Tea was served there and Bailie Mrs. Beel expressed the thanks of the Association to the company for its hospitality.

Why Electricity Shares are Rising!—The *Financial Times* credits Mr. A. M. Samuel, Minister for Overseas Trade, with the expression of some quite original observations pointing to the effect of imported Louis XV or XVI furniture upon electricity shares. This is how it quotes him:—

"Why should the ante-rooms of hotels prefer very expensive foreign-made furniture of that design? A very good effect was produced in the Stock Exchange yesterday by the announcement, Electricity shares recording further rises."

As usual, we suppose, the poor printer will be blamed!

German Electrical Porcelain Industry.—German firms report a not immaterial diminution in the arrival of orders for porcelain for electrical purposes in the past few weeks. Various works have been compelled to restrict operations and dismiss workers. The inland demand in particular has largely declined owing to the reserve manifested by the electricity works. The extension of the export trade is also meeting with difficulties, particularly in consequence of the "exchange dumping" of French works in various foreign markets.

New Indian Companies.—Among the new concerns recently organised in connection with the electrical trade and electricity supply in India are the Electric Warehouse Co., of 2, Kalasipalayan, Bangalore City (Mysore), capital 100,000 rupees; the Bellary Electrical Corporation (1926), Sitarama Chetty, Bellary (Madras), capital 500,000 rupees; and the Gorakphur Electric Supply Co. (United Provinces), capital 200,000 rupees.

Liverpool Civic Week.—One of the features of the Liverpool Civic Week which was inaugurated on Friday last was a Commerce and Industries Exhibition in the Owen Owen building. One of the outstanding displays was that of the Automatic Telephone Manufacturing Co., Ltd., which exhibited the Strowger automatic telephone system. Sections of the London Exchange equipment were shown, with specimen mechanisms and telephones. Visitors were invited to test these instruments for themselves. There was also on view a three-level "A.T.M." colliery winding signal indicator, a fire-alarm station, "Xcel" electrical domestic appliances, and "Claritone" radio apparatus. Messrs. Garnett, Whiteley and Co., Ltd., showed "Lotus" radio componenta. There was a reproduction of a ship's wireless cabin containing a complete display of instruments, with an operator in attendance. The Liverpool Electric Cable Co., Ltd., and the London Electric Wire Co. and Smiths, Ltd., undertook the wiring of the exhibition building. The Liverpool Electric Cable Co. demonstrated the braiding of cables, and showed a big variety of representative products. Other stands were occupied by the Electric Cleaning Co., Liverpool, the Macintosh Cable Co., Ltd., Callender's Cable and Construction Co., Ltd., Radio Supplies, and the British Horo-Electric, Ltd. On the plateau of the St. George's Hall, Liverpool, there was opened on Saturday last a demonstration all-electric house, similar to those being built on the suburban housing estates. This dwelling was open to public inspection during the week, and, being fully furnished, embodied a series of useful suggestions, showing how the work of running a house might be reduced to a minimum. The electrical appliances were supplied by the Corporation Electricity Supply Department, and so far as the lighting fittings were concerned, duplication was avoided so as to demonstrate as many different types as possible.

Ore Smelting in Sweden.—It is reported from Lulea, Sweden, that new plans have been prepared for resuming activity at the Lulea ironworks, by adopting the iron smelting process of the Norwegian Steel Company, which has proved satisfactory on experimental working at Trondhjem. Influential persons at Lulea are said to be behind the scheme.

Trade with Poland.—After a recent visit to Poland, Mr. G. H. Locock, C.M.G., assistant director of the F.B.I., reports an improvement in economic conditions in that country. He says that British goods are highly thought of, and on equal terms would probably be preferred to the goods of any other country. Their prices, however, are very high, and in some cases are quite out of the reach of Polish purchasers. For the fostering of British trade, attention to the following points is necessary:—Credit must be granted, but only after careful investigation. There are many first-class concerns with whom it is safe to do business on these terms. The market should be studied at first hand and reliance should not be placed on German intermediaries. The desirability of consignment stocks should not be overlooked, especially as Polish buyers are prone to "hand-to-mouth" purchasing. The importance of the language question is very considerable. Outside certain comparatively restricted circles English is useless, and a knowledge of French or German is essential. Catalogues should best be in German. Poland will assume greater importance when private trade with Russia becomes open once more.

Local Exhibition.—Warrington.—The borough electrical and tramway engineer of Warrington (Mr. F. V. L. Mathias)

Fig. 1.—An Electrical Exhibit at Warrington.

has sent us photographs (reproduced herewith) taken during the town's recent civic, shopping and Empire week. The first illustration (fig. 1) depicts a stand at an exhibition which was arranged by the Electricity Department. As will be seen, the many domestic uses of electricity were well demonstrated. Fig. 2 shows the illumination of the top of the electricity

Fig. 2.—Illumination of the Electricity Works Shaft.

works shaft, 160 ft. high. Advantage was taken of the fact that steeplejacks were at work repairing the shaft to get them to fix up the necessary lamps.

Finnish Tariff Reductions.—The *Board of Trade Journal* states that under the recently-concluded agreement between Finland and Germany the duties upon certain goods upon importation into Finland have been reduced. The list includes electrical machines weighing between 250 and 500 kg. each, such as dynamos, motors, converters, transformers, choking coils, &c., upon which the duty is reduced to 5.60 Finnish marks per kg. The new rate on "electrotechnical special apparatus and parts" not specifically mentioned (except magnetos, radio apparatus, arc and induction "stoves" (furnaces), welding apparatus and magnetic separators) is 6.50 marks per kg. These new rates are applicable to goods of United Kingdom origin.

The British Industries Fair.—Despite the holiday season and the serious effects of the coal stoppage, applications for space in the London Section of the British Industries Fair, which is to be held at the White City from February 21st to March 4th next, have been reaching the Department of Overseas Trade daily. The total area applied for already considerably exceeds the whole area occupied at the last fair, and there is every indication that additional buildings will have to be linked up with those previously used. Early arrangements will have to be made for any such extension, however, and firms are advised to make their requirements known at once. Among firms who have applied for space in the wireless section are:—

Harold Ashton.	Halcyon Wireless Co., Ltd.
Beard & Fitch, Ltd.	Hart Accumulator Co., Ltd.
Sydney S. Bird & Sons.	Kemps Mills, Ltd.
British Electrical Sales Organisation.	J. W. Lee & Sons, Ltd.
British General Manufacturing Co., Ltd.	Spauldings, Ltd.
S. G. Brown, Ltd.	Technical Agencies Co.
Brownie Wireless Co. (of Great Britain), Ltd.	Telegraph Condenser Co., Ltd.
J. J. Eastick & Sons.	Tungstone Accumulator Co., Ltd.
Ever-Ready Co. (Great Britain), Ltd.	Watmel Wireless Co., Ltd.
Formo Co. (Arthur Preen), Ltd.	Western Laboratories, Ltd.
R. F. Graham & Co.	Whittingham, Smith & Co.
	M. & A. Wolff.

Book Notices.—"Crankshaft Design," by C. C. Pounder.—A publication of the Technical Section of the Association of Engineering and Shipbuilding Draughtsmen, being the second printed lecture for the session 1926-27.

"Faraday House Testing Laboratories Scale of Fees."—This booklet contains full information about the available facilities for carrying out tests; in the revised scale of fees many alterations are noticeable, both in the scope of the tests and the charges therefor.

"Post Office Electrical Engineers' *Journal*." Vol. XIX. Part 3. October 1926. London: Electrical Review, Ltd. Price 1s. 6d. net.

"Theory of Electricity." By G. H. Livens. Second Edition. Pp. 427; figs. 46. London: Cambridge University Press. Price 16s. net.

Messrs. Pritchett & Gold and E.P.S. Co., Ltd., have issued an instruction book relating to "NI-FE" (nickel-iron) train-lighting batteries. This gives many hints on installation, maintenance, testing, &c., and is believed by the company to be the first of its kind so far as alkaline batteries are concerned.

A Novel Advertisement.—A great deal is heard of Magna Charta, but little more than the name is known to many people. The St. Helens Cable & Rubber Co., Ltd., has, therefore, done well in publishing a translation of the charter as a part of its publicity matter. The company's justification for the step, if any is required, is that its Slough works are only five miles from Runnymede.

For Sale.—The South London Merchandise Mart will sell by auction on November 3rd, at York Terrace, Clapham Road Station, S.W.4, a stock of electrical and wireless goods.

Irish Free State Electrical Imports.—The imports of electrical goods, excluding machinery, into the Irish Free State during August last amounted to £37,594, as compared with £26,936 in the corresponding month of 1925. The official returns for the first eight months of the year show a total of £296,001, as against £209,438 in the corresponding period of 1925.

Prospects in South America.—At a luncheon given in his honour recently, Mr. Lints Smith, manager of *The Times*, gave some impressions of his tour of South America. He said that we apparently could not compete successfully with the United States and Germany in our prices, and our methods might be greatly improved. South American countries showed a preference for British goods, but it could not continue indefinitely. He considered that Brazil was worth watching, as the country had a great future. In Argentina, as well as other States, we had to contend not only with active foreign competition, but also with deliberate national development. Some of our rivals were meeting that development by the establishment of factories in South America.

Trade Announcements.—The AUTOCAR ELECTRICAL EQUIPMENT CO., Mitchell Street, E.C.1, states that the lighting, starting and ignition equipment of the "Essex" car is now manufactured by Auto-Lite.

MR. W. HAMILTON WILSON, M.I.E.E., has removed to new works at 125 and 127, Red Lion Road, Tolworth, Surbiton.

MR. ALAN WRIGHT, 124, Chancery Lane, W.C.2, announces altered and additional telephone lines. His numbers are now: "Holborn 1312 and 133."

MESSRS. T. H. ARNOLD & SON, electrical contractors, of Stowe Street, Lichfield, are opening showroom premises in Tamworth Street, at that city.

MR. R. J. MILLARD, of 52, Delph Lane, Hyde Park, Leeds, has been appointed North of England representative to Electrical Utilities, Ltd., to represent them in Northumberland, Durham, Cumberland, Westmoreland, Yorkshire, and Lancashire.

THE ARMORDUCT CABLE CO., LTD., has opened a new depôt at 54, Wellington Street, Leeds, to cover Yorkshire and the Midland Counties.

Catalogues and Lists.—THE ELECTRIC HEATING CO., George Street, Croydon.—A priced folder illustrating the company's electric fires, irons, and other domestic appliances.

THE RAPID CARRIER TRICYCLE CO., LTD., 6-8, Emerald Street, Theobald's Road, W.C.1.—A folder advertising the company's tricycles for the conveyance of goods.

MESSRS. HOUGHTON-BUTCHER (GREAT BRITAIN), LTD., 88-89, High Holborn, W.C.1.—A novel letter addressed to radio dealers advertising the company's service.

MESSRS. W. H. SUGDEN & CO., LTD., Glenny Road, Barking.—A stock list of d.c. and a.c. motors ranging from 0.5 to over 200 h.p.

VENNER TIME SWITCHES, LTD., 45, Horseferry Road, S.W.1.—List No. 35, containing fully-illustrated particulars of time switches for handling large currents—50 A and over—with oil breaks and special double-spring motors; also List No. 34, dealing with an automatic staircase switch. Both lists include prices.

MESSRS. L. G. HAWKINS & CO., LTD., 30-35, Drury Lane, W.C.2.—A leaflet advertising the "Universal" electric heating pad.

POPE'S ELECTRIC LAMP CO., LTD., 5, Arthur Street, New Oxford Street, W.C.2.—A leaflet advertising "Pearl Elasta" gasfilled lamps, and a pamphlet giving prices of "Elasta" gasfilled and vacuum lamps.

THE BRITISH THOMSON-HOUSTON CO., LTD., Crown House, Aldwych, W.C.2.—Pamphlet No. L.385, containing particulars and prices of "Mazda Pearl" (internally frosted) lamps; also Folder L.370, dealing with "Mazda" lamps generally (priced).

THE BRITISH THOMSON-HOUSTON CO., LTD., Rugby.—A series of publications dealing with "Fabroil" gears and blanks (2531-B); oil-immersed circuit breakers for pressures up to 33,000 V (4172); a.c. rheostatic motor starters (5115-D); air-break Y-delta starters (5111-D); drum-type relays (4401-D); a.c. motor control pillars (5356); and switch-fuses for outdoor service (4327).

MESSRS. A. W. BEUTTELL, LTD., 53, Victoria Street, S.W.1.—Publications advertising "Linolite" and "Little Giant" reflectors, for shop use, and the "A.A." earth clip. Priced.

MESSRS. C. H. PARSONS, LTD., Britannia Works, Wharfdale Road, Tyseley, Birmingham.—An illustrated price list of "Britmac" tumbler switches, switch plates, lampholders, &c.

MESSRS. J. A. CRABTREE & CO., LTD., Lincoln Works, Walsall.—Leaflet No. 1009, containing illustrations and prices of the company's 15-A plugs and sockets of a variety of patterns.

THE WHOLESALE FITTINGS CO., LTD., 23-27, Commercial Street, E.1.—Supplement 186, bearing illustrations and prices of "Altolite" lighting glassware (imitation alabaster).

MESSRS. MATTHEWS & YATES, LTD., Swinton, Manchester.—Two illustrated pamphlets dealing with the company's fans and motors, and another advertising "Cyclone" portable acetylene generators.

MESSRS. ALFRED GRAHAM & CO., 25, Savile Row, W.1.—The company has issued a handsome coloured showcard depicting its "Radiolux" loud speaker, one in sepia and white dealing with "Amplion" loud speakers and valves, and a third, in red, white and black, bearing a composite caricature of well-known radio artistes. A wall sheet bearing illustrations and prices of all types of the company's loud speakers is also available.

THE GREAT NORTHERN TELEGRAPH CO., LTD., OF DENMARK, 5, St. Helen's Place, E.C.3.—The London office of this company has sent us a catalogue which appears to mark a new departure. It contains fully-illustrated details of telegraph apparatus of all kinds which is made for sale at the company's Danish instrument works. The publication is provided with a thumb index for easy reference.

THE CHLORIDE ELECTRICAL STORAGE CO., LTD., Clifton Junction, near Manchester.—A four-coloured poster (20 in. by 30 in.), advertising "Exide" accumulators for radio work.

MESSRS. PHILLIPS & TURNER, Cambridge Street, Birmingham.—Two leaflets advertising lampholders, one priced and the other with spaces for retailers' prices.

THE GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2.—Folder F.4239, containing illustrations, particulars and prices of "Gecofix" pendants, brackets, lanterns, and other lighting fittings. Also Leaflets S.L. 4233 and 4234, containing pictures and details of the company's stage lighting apparatus.

MESSRS. HANS RENOLD, LTD., Burrage Works, Didsbury, Manchester.—Booklet 00045, containing full details of "Renold" standard chain drives.

MESSRS. JAMES GORDON & CO., LTD., Windsor House, Kingsway, W.C.2.—Catalogue "H," a brochure dealing extensively with the company's hydro-electric plant. Small low-head installations receive special attention.

METRO-VICK SUPPLIES, LTD., Metro-Vick House, 155, Charing Cross Road, W.C.2.—A comprehensive catalogue of "Cosmos" electric lamps, containing illustrations and prices of gasfilled, vacuum, opal, traction, tubular, and other types. Also a priced wall-sheet.

MESSRS. E. BROOK, LTD., Empress Works, Huddersfield.—Stock lists of new and reconditioned d.c. motors and generators, and a.c. motors.

THE MARCONIPHONE CO., LTD., 210-212, Tottenham Court Road, W.1.—A coloured cardboard cut-out advertising "Mellovox" loud-speakers and a window transfer advertising "Marconi" valves.

"MILLERPHONES," 12, Holborn Viaduct, E.C.1.—Pamphlets dealing with the firm's intercommunication telephones and the "Lazilite" telephone extension arm.

HIGGS MOTORS, Witton, Birmingham.—A stock list of a.c. and d.c. motors, and a leaflet describing the firm's star-delta, series-parallel and direct starting switches.

MESSRS. SIEMENS BROS. & CO., LTD., Woolwich, S.E.18.—An interesting booklet on Siemens ebonite, containing a great amount of technical data as well as illustrations of moulded and machined ebonite parts.

WOODFYT SALES, LTD., 8, Diana Place, N.W.1.—An illustrated and priced catalogue of wood standards, brackets, and other fittings for electric lighting.

MESSRS. RUSTON & HORNSBY, LTD., Lincoln.—A 56-page brochure containing many illustrations of examples of the "Ruston" vertical oil engine, with reports of tests, constructional details, &c.

Bankruptcy Proceedings.—G. BOYD, New Road, Mousehill, Milford, Surrey, electrical engineer.—The receiving order in this matter was made recently on debtor's own petition. The statement of affairs shows liabilities of £282, against assets of £31, leaving a deficiency of £251. Debtor attributes his failure to want of capital and bad trade owing to the coal dispute. It appears that in July, 1925, with £12 capital he commenced business as an electrical engineer, doing chiefly repair work, but the business has not been successful. On September 14th last the Sheriff levied execution, and on September 24th sold his stock and plant. The first meeting of creditors was held on October 13th, when the case, being a summary one, was left with the Official Receiver as trustee of the estate.

H. L. SMITH, electrician, 156, Tredegar Road, and late 10, Ordell Road, Bow.—The first meeting of creditors was held on October 14th, the debtor having filed his petition on September 30th. No accounts were presented, but the Official Receiver reported that the debtor roughly estimated his liabilities at £1,543, against assets valued at £43. He had stated that he started business in 1912, but had to close down on joining H.M. forces in 1915, and on his return found that the stock, which had been worth £500, had depreciated in value to the extent of £200. He resumed the trading, which before the war had proved remunerative, and in March, 1925, took a shop at a rent of £1 a week. A wound received while on service had handicapped him, and as a result the trade had fallen away. His principal creditor was his father, to whom he owed £1,300, in respect of cash advanced for the purposes of the business and paid for medical treatment. A judgment creditor recently threatened to levy an execution, whereupon the defendant stated, he had no alternative but to file his petition, an offer of a composition of 5s. in the £ having been rejected. The failure was attributed to the debtor's ill-health and to mismanagement by a late manager. The estate was left in the hands of the Official Receiver.

W. H. COX and J. M. SANTOLINI (trading as COX and Santolini), electric sign makers, 179, Old Street, E.C.—The public examination of these debtors was held on October 13th before Mr. Registrar Warmington at the London Bankruptcy Court, the accounts showing liabilities of £465 and assets of

£10. The debtors started business in February, 1925, with a borrowed capital of £50, and traded until May, 1926, when, in consequence of a judgment having been obtained by the largest creditor, they closed down. The failure was attributed to lack of capital, interest on borrowed money, and to the profits having been insufficient to meet drawings. The examination was concluded.

H. Robinson, electrician and wireless and cycle dealer, 4, Wigan Lane, Wigan.—First meeting held October 19th. Public examination, October 28th, at the Court House, Wigan.

W. S. Miles, radio engineer, Roslyn, Worston Road, Burnham-on-Sea.—Last day for proofs for dividends, October 26th. Trustee, Mr. F. W. Darley, Official Receiver, 26, Baldwin Street, Bristol.

J. G. F. Rennie, electrical engineer, 19, Bridge Street, Andover.—Last day for proofs for dividend, October 26th. Trustee, Mr. T. Barton, Official Receiver, City Chambers, Catherine Street, Salisbury.

H. C. Hall, electrical and fancy goods dealer, The Pantechnicon, 5, Chapel Street, Penzance.—Last day for proofs for dividend, October 29th. Trustee, Mr. C. Hancock, Official Receiver, 12, Princess Street, Truro.

B. G. Thompkins, radio engineer, Armstrong's Buildings, Stanley, Durham.—Last day for proofs for dividend, November 1st. Trustee, Mr. R. W. Cave, Official Receiver, 81, St. Mary's Place, Newcastle-on-Tyne.

Company Liquidations.—Wates Bros., Ltd., Great Queen Street, Kingsway, W.C.2, electrical manufacturers.—A largely attended meeting of creditors was held on October 14th, at the Institute of Chartered Accountants, E.C. The chair was occupied by Mr. W. B. Anderson, C.A., of 40-43, Norfolk Street, Strand, W.C.2, the liquidator in the voluntary liquidation of the company. The statement of affairs presented showed liabilities of £6,250, of which £4,268 was due to the trade and £1,982 to cash creditors. The assets were estimated to realise £1,549, from which had to be deducted £141 for preferential claims, leaving net assets of £1,408, or a deficiency so far as the creditors were concerned of £4,842. The estate showed approximately 4s. 6d. in the £. There were various contingent claims in respect of uncompleted contracts. At the moment only one claim had actually been received, for £1,227, and it had not been included in the liabilities. The full amount of the contingent claims was not known. The issued share capital was £4,998, but in addition shares which had previously been allotted were sold and the company received £2,150, bringing the total deficiency up to £11,989. Of that amount £9,379 was accounted for by the estimated loss on the realisation of the assets, and the balance of £2,610 represented trading losses during the last nineteen months. Mr. Anderson reported that the company was registered in 1923 for the purpose of taking over as a going concern the business of manufacturers and dealers in all kinds of electrical goods which had previously been carried on by Mr. F. S. S. Wates. The company had a nominal capital of £5,000, and with the exception of two shares the whole of it was allotted to the vendor or his nominees by way of purchase consideration for the assets acquired. Under the agreement for the sale of the assets to the company it was stipulated that Mr. Wates should collect all the debts due to the business up to July 1st, 1923, and discharge all the liabilities. As was usual in such cases, however, where a business was carried on by a company succeeding an individual, the limited company paid the liabilities and collected the book debts. Later it was ascertained that the liabilities had exceeded the assets by between £2,000 and £3,000, and the amount was debited to Mr. Wates's account. The directors of the company throughout had been Mr. F. S. S. Wates and Mrs. Wates. Accounts for eight months' trading to February 29th, 1924, disclosed a net profit of £1,549. The auditors, however, submitted those accounts with various qualifications. Further accounts were prepared as at August 31st, 1924, which showed that for the preceding six months a loss of £1,881 had been incurred. Thus, during the first fourteen months the company made a net loss of approximately £330. Accounts for the six months to February 28th, 1925, showed a net profit of £265. The whole of the deficiency had arisen since March 1st, 1925. In 1923 the company secured the sole selling rights for certain radio appliances. Good profits were earned, and up to February, 1925, that business was satisfactory, but the selling expenses and overhead charges were high. The company started without any fresh working capital, and became short of money, with the result that it was not possible to buy to the best advantage. The value of stock which the company possessed during recent months, which could be readily turned over, was considerably less than the figure at which it appeared in the balance sheets. Then, when the slump came in the wireless trade, the position was acute. Further capital was required, and instead of issuing additional shares, the stock already allotted to Mr. Wates and his nominees was sold for cash and the company received the money. Shares to the face value of £1,000 were also transferred to a creditor in satisfaction of part of his debt. The shares sold for cash, and of which the company received the benefit, totalled £2,150, whilst rather more than £2,000 was borrowed. There was a serious diminution in the turnover, and many bad debts were sustained, owing to failures amongst wireless dealers. The new money which the company received was soon absorbed, and the position shortly before the liquidation was that the company had the greatest difficulty in meeting the demands of its creditors. Certain gentlemen who had already assisted the company, and were considerable creditors, were asked to provide additional capital. They were prepared to help if an investigation of the company's position warranted their doing so. An investigation was accordingly made, but the creditors concerned decided that they could not give any further assistance. Mr. Wates possessed certain patent rights which were not transferred to the company at its inception. Subsequently, however, the company agreed to purchase those from Mr. Wates for £5,000, and that amount was credited to the account of that gentleman in the books of the company. In addition, the company possessed various trade marks and names, in connection with batteries, but he was doubtful whether they had any value. The books showed that Mr. Wates was a debtor to the company to the extent of about £500, but Mr. Wates claimed, with justification, that the sum was more than covered by the salary due to him. Since his appointment as liquidator he (Mr. Anderson) had been able to make arrangements with wireless manufacturers for the supply of goods at a profit. The company had conducted a mail order business, and some customers had remitted money about the time of the liquidation, and had not received the goods. The orders, however, could not be executed, as there was not the stock in the warehouse at the moment. Those customers could only rank as ordinary creditors. In reply to a question, the chairman said that the patents were transferred to the company on March 17th, 1925. Mr. Wates possessed an instrument for sending automatic messages from aeroplanes, or small ships. That invention was transferred to the company. It was believed to be a valuable invention, the Japanese rights alone being sold to the Government of that country for £1,000, whilst machines had also been disposed of to the British Government and the Tank Corps. A resolution was passed confirming the voluntary liquidation of the company with Mr. Anderson as liquidator, together with a committee of the principal creditors.

Compacto Electrical Engineering Co., Ltd.—A final meeting of members is called for November 10th, at 22a, Pembridge Road. Liquidator, Mr. R. Osborne.

Gwynne's Engineering Co., Ltd.—Winding up order made by the High Court on October 13th.

Dissolution of Partnership.—H. Seabrook & Co., electrical engineers, 178, Katherine Road, East Ham.—Mr. H. Seabrook and Mr. A. B. Waugh have dissolved partnership. Mr. Seabrook will attend to debts.

Deed of Assignment.—H. J. N. Witherington (Wireless Instrument Co.), electrical engineer, 62, Harpur Street, Bedford.—Particulars of claims by October 30th, to the Trustee, Mr. L. Jordan, County Chambers, 87, High Street, Bedford.

The Supply Industry and the General Strike.—The National Joint Industrial Council for the Electricity Supply Industry met in London on October 15th to receive a recommendation from its Negotiating Committee which was considering the conditions which had arisen as the outcome of the general strike. The committee's recommendation was unanimously adopted and as a result the National Council has resumed its functions and recommended to its 13 District Councils to similarly resume as quickly as possible.

Unemployment. — The unemployment returns dated October 4th showed a total of 1,572,700 as compared with 1,527,751 on September 27th, and 1,297,628 on October 5th, 1925. The week's increase was thus about 45,000.

British Radio Apparatus in Peru.—The increased popularity of broadcasting in Peru and the success attending sales at low prices have made it possible to sell sets at even lower prices. A company has recently been formed, composed mainly of British capitalists, to stimulate sales and increase the popularity of British-made apparatus in the Republic.—*Reuter's Trade Service* (Lima).

Electric Lamp Publicity.—Crypselco, Ltd., has produced for the use of retailers of its electric lamps a series of cardboard cut-outs and showcards in colours, as well as a fully-illustrated catalogue and folders.

The E.D.A.-E.L.M.A. Campaign.—Mr. Harry Moss, of Bradford, has sent us a photograph of his shop window dressed in accordance with the directions of the organisers of the campaign. This is an example which, we hope, is being widely followed.

Aluminium Production in Norway.—It is stated by a Norwegian telegraph agency that the A.S. Smelteverk Glomfjord was formed in London on September 30th with a share capital of 3,000 000 kr., of which one-half will be paid this year and the balance next year, with increases at a later date. Among the directors are mentioned the name of Mr. Robert E. Tod, who is now associated with the British Aluminium Company. The new company will take over a necessary link in the regular production of aluminium, which now proceeds in England. Actual production will be started next autumn; in the meantime offers are to be obtained from international firms for the supply of the electrical plant.

New Company Registrar.—Mr. C. G. Gallagher has been appointed Registrar of Joint Stock Companies and Registrar of Business Names in the place of Mr. A. E. Campbell-Taylor, who has retired.

Utilities and Service.—A correspondent of the *Electrical World* complains of the high cost of "servicing" domestic electrical appliances in the United States. He points out that when these appliances are out of action the power company is losing revenue. Therefore it is in the utility's own interest to provide the necessary service to keep appliances in working order at a small cost to the consumer.

Philips Lamp Campaign.—PHILIPS LAMPS, LTD., in embarking upon a campaign of intensive lighting propaganda, has produced for the use of retailers a number of coloured showcards, cut-outs and posters, as well as a series of pamphlets and catalogues.

The Business Research Association of Great Britain.—The first meeting of the Session 1926-7 was held on October 13th, at the Old Colony Club, Aldwych, the Association's headquarters. Mr. W A. Cooke, B.Sc., President of the Association, delivered an address on "Research as an Aid to Management." An interesting discussion followed on the methods of developing research in Great Britain to aid industries to reach the high state of efficiency which parallel industries in U.S.A. had attained through the application of the principles of research. It was emphasised by several speakers that the newness of the idea of applying research to the field of management in its many phases needed overcoming in this country. Soon this idea would be generally accepted and research in business methods would be recognised as being as inevitable as research in physics or chemistry. Its value could not be contested, and the Association, in striving to further this matter in Great Britain was attempting a good work in the conduct of British business. Mr. Menken, B.A., suggested that the Empire Marketing Board might well consider setting up a research section to deal with the problems of marketing. The president, in his reply to speakers, expressed the opinion that the research idea existed in the mind of every progressive business man and only needed developing by a broader education in the scientific methods which had worked so well in U.S.A., and were being taken up in Germany. Great Britain would not lag behind these countries if she recognised the value of these principles. The Business Research Association hoped in its small way—perhaps in the future a much bigger way—to foster the growth of scientific business methods in this country. He felt that industry was already making firm strides in this direction, and the future held a bright outlook for the Association's work. The next meeting will take place on October 27th, at 7.30 p.m. (dinner at 6.30) when Mr. J. C. Kirkwood will deliver an address on "Some Practical Results of the Application of Market Research."

A Radio Log Book.—THE GENERAL ELECTRIC CO., LTD., is enclosing in all its 40-W and 60-W lamp cartons a little folder upon which the dial readings for the reception of various broadcasting stations can be recorded. The correct arrangements of "Osram" valves in combination are also given.

Dublin Radio Exhibition.—Arrangements are being made for the holding of a radio exhibition in Dublin during the first week in November, under the auspices of the Irish Radio Traders' Association, a newly-formed body, which includes in its membership representatives of many well-known manufacturers in Great Britain and abroad. The exhibition will be held at the Mansion House, Dublin.

Floodlighting in Manchester.—The new offices of the Manchester Ship Canal Co., King Street, Manchester, are now floodlighted. The work was carried out by Messrs. John Lighttoot, Manchester, with fittings made by the Wardle Engineering Co., Ltd.

The Sydney Power Plant Contract.—We recently reported that application had been made for an injunction restraining the Commonwealth Shipping Board from carrying out at the Cockatoo Dockyard part of the large contract for power plant for the Sydney City Council. Mr. Forbes Mackay, the City Electrical Engineer, recently recommended that, in the event of the injunction being granted, the Council should award the whole of the contract to the Metropolitan-Vickers Electrical Co., Ltd., according to the Sydney *Daily Guardian*. The contract price is £666,605, and the Metropolitan-Vickers Co. was already to do a part of the work. The City Electricity Committee has adopted Mr. Mackay's report, but recommends negotiations with the company as to the cost.

Lighting and Power Notes.

Birmingham.—LOANS SANCTIONED.—The Corporation Electricity Committee has obtained sanction to the borrowing of the following sums:—£12,000 for main transmission line, £238,000 for various works, and £194,300 for plant.

Bradford.—INAUGURATION OF SUB-STATION.—The automatic sub-station at Four Lane Ends was formally inaugurated on October 13th. This station will be used primarily for assisting the tramway supply. The total cost of the new station was £17,000.

Bucks.—HOSPITAL SUPPLY.—The Visiting Committee of the County Mental Hospital has received a report from Messrs. Edwards & Shaw, consulting engineers, of Birmingham, regarding the electricity supply for the hospital, in which the Committee is advised to continue to generate its own supply rather than obtain it from Aylesbury Corporation at 1½d. per kWh, and in order to meet the demand for additional supplies a scheme to utilise the exhaust steam has been recommended at an estimated cost of £4,800. The engineers' report has been adopted.

Cardiff.—ELECTRICITY EXTENSIONS.—The Finance Committee has approved the borrowing of £100,000 for extensions to the electricity undertaking during the next 2½ years, and £10,000 for the erection of sub-stations.

Carlisle.—ELECTRICITY EXTENSIONS.—The city electrical engineer has recommended the Electricity Committee to carry out mains extensions to link up Harraby and Currock, at a cost of £1,638. The Council has received sanction to a loan of £5,500 for mains for the supply of electricity to the Cocklakes Works, and to meet the increased demands of the Gotham Co., Ltd., a further loan of £1,784 has been applied for.

Continental.—AUSTRIA.—Plans are being prepared for what, it is claimed, will be the largest hydro-electric plant in Europe. The station is to be erected on the Danube at Klosterneuburg, near Vienna, and will be designed to meet the growing demand for electricity in Vienna, and also for the operation of the electrified Austrian State Railways in the Vienna area. It is stated that the necessary capital for the undertaking is being provided by two Austrian banks in conjunction with an American financial syndicate, and that the whole of the plant will be of Austrian construction.

Douglas (Isle of Man).—INQUIRY.—A Government inquiry was held on October 10th into the application of the Town Council for sanction to a loan of £83,000 for extensions to the electricity works, plant, mains, services, &c. It is proposed to install steam plant of 1,000-kW capacity. There was no opposition.

Dover.—LOAN.—The Electricity Committee is seeking sanction to a loan of £3,000 for mains.

Gillingham (Kent).—PRICE REDUCTIONS.—The Town Council has reduced the charges for electricity as under:—Lighting, flat rate, from 7d. to 6d. per kWh; prepayment rate, from 8½d. to 7½d. per kWh; maximum demand rate, from 10d. and 3d. to 9d. and 2½d.

Hastings.—HIRE OF DOMESTIC APPLIANCES.—The Town Council has adopted a recommendation of the Electricity Committee to let out on hire electric cookers and other domestic appliances, the hirer to bear the cost of the necessary wiring from the meter to the appliance.

Hazel Grove and Bramhall.—LOAN.—The Urban District Council has applied for sanction to a loan of £5,000 for mains and services.

Liverpool.—LOANS.—The Electric Power and Lighting Committee has received sanction to borrow £2,300 for the provision of sub-station buildings and plant on the Walton-Clubmoor housing estate. Application has now been made for sanction to a loan of £15,655 for mains and services for the Fazakerley Hall housing estate.

APPLICATION FOR ORDER.—The Committee proposes to extend the mains to supply new houses at Hunt's Cross, and application is to be made for an Order authorising the supply. Switchgear is to be removed from Lister Drive station to Fairclough Lane sub-station, at an estimated cost of £1,200, and the surveyor has been instructed to proceed with the necessary building work, at an estimated cost of £5,000.

London.—ISLINGTON.—The Electricity Committee has decided to lay a special main from the power station to the works of Betts British Foil Factories, Ltd., at a cost of £6,320, and provide a power factor corrector costing £1,219.

HORNSEY.—The Electricity Committee has decided to carry out mains extensions at a cost of £1,150.

WOOLWICH.—*Price Reductions.*—The Town Council is to introduce the following reduced scale of electricity charges:—Supply for business and domestic premises: £16 per kW of maximum demand per annum, plus ½d. per kWh for electricity consumed, with a discount of 5 per cent. for prompt payment of accounts, in substitution for the present contract rates and the domestic rate of 2d. per kWh. Hire of electric cookers: Reduced from 15s. to 7s. 6d. per quarter.

Lossiemouth.—NEW PLANT.—The borough electrical engineer (Mr. R. A. Traill) has recommended that additional plant be installed at the generating station to meet the anticipated increased demand for electricity during the winter. He suggests replacing one of the original 25-kW sets by a modern crude oil engine direct coupled to a dynamo of at least 60-kW capacity. The matter has been remitted to the Electric Lighting Committee for consideration and report.

Maidenhead.—LOANS SANCTIONED.—The Town Council has received sanction to loans of £8,540 for e.h.p. mains, and £2,960 for transformers, kiosks, and switchgear.

NEW ELECTRICITY CHARGE.—The Council has adopted a two-part tariff for electricity for domestic purposes at a fixed annual charge equivalent to ¼th of the rateable value plus ½d. per kWh for electricity consumed.

Middlesbrough.—INQUIRY.—An inquiry was held by Col. T. C. Ekin, on behalf of the Electricity Commissioners, on October 12th and 13th, into the application of the Corporation for sanction to erect a new power station at a cost of £142,000, instead of continuing to take bulk supplies from the Cleveland and Durham Electric Power Co. For the Corporation it was stated that it would be cheaper to generate its own supply than to take a supply from the company. The saving to the Corporation in 10 years' time was estimated at £19,000 per annum. The company opposed the application on the ground that the construction of another small independent generating station was opposed to the principles laid down in the Weir Report, and that although the company was prepared to submit the question of charges to the Electricity Commissioners, the Corporation had refused to accept the decision of an impartial tribunal. The Commissioners' decision will be given in due course.

Peru.—Hydro-Electric Development.—A concession has been granted to Senor Lizandro A. Proana for the construction of a hydro-electric station with a capacity of 12,000 h.p. at Tamboraque on the Central Railway of Peru. Electricity will be supplied to the Tamboraque and the neighbouring Morococha, Puna Grande, Viso and Germania mines. The installation, which will cost £301,200, will include four generators of 4,200 h.p., with a transmission line of 40 km. Construction work will probably take three years. A German tender for the work has been accepted.—*Reuter's Trade Service* (Lima).

Price Increases.—Owing to the higher cost of coal, increases in the charges for electricity have been made or recommended in the following districts:—

Stafford.—Electricity for all purposes, other than lighting: An increase of ¼d. per kWh.

Dundee.—An increase of 10 per cent.

Canterbury.—An increase of 1d. per kWh for lighting, and ¼d. per kWh for all other purposes.

King's Lynn.—Lighting: An increase of ¾d. per kWh. Power: An increase of ¼d. per kWh.

Leicester.—An increase of 1d. per kWh.

Birmingham.—Lighting and l.p. power: An increase of ¼d. per kWh. The prices for large power supplies will be adjusted automatically according to the variations in the cost of coal.

Hull.—Lighting and domestic supplies: An increase of 10 per cent.

Oxford.—*The Oxford Electric Co., Ltd.*—Electricity for all purposes: An increase of 10 per cent.

Rhyl.—Change-over.—The *Manchester Guardian* reports that the Urban District Council is taking steps to change over its system of electricity supply from d.c. to a.c. Sanction has been received to a loan for the installation of the necessary plant.

South Shields.—Loans Sanctioned.—The Corporation has received sanction to loans amounting to £118,578 for the following purposes:—Assisted wiring scheme, £35,000; mains and services, £70,000; meters, £10,000; transformers, £2,000; Cleadon Park sub-station, £1,378; Reed Street sub-station, £200.

Special Orders.—Application has been made to the Electricity Commissioners by the Power Development Co., Ltd., for a Special Order authorising it to supply electricity within the urban districts of Rugeley and Uttoxeter, and certain parishes in the rural districts of Lichfield, Uttoxeter, and Stafford.

The Commissioners have submitted to the Minister of Transport for confirmation Special Orders made by them authorising the South Wales Electrical Power Distribution Co., to supply electricity in the urban district of Llanfrecha Upper, and the Newcastle-upon-Tyne Electric Supply Co., Ltd., in the rural district of Prudhoe and part of the rural district of Hexham.

Teignmouth.—Supply to Shaldon.—It was reported at the October meeting of the Urban District Council that the Electricity Commissioners had intimated the receipt of an application from the Teignmouth Electric Light Co., Ltd., for permission to lay a three-inch cable across the River Teign from Teignmouth to Shaldon, to provide a supply for the latter district. The Council decided to raise no objection to the scheme.

Torpoint (Cornwall).—Electricity Supply.—The Urban District Council has decided not to negotiate with the Torpoint Electric Supply Co., Ltd., with regard to the proposed purchase of the electricity undertaking, but to leave this question with the Electricity Commissioners and proceed with the application for an electricity Order.

Torquay.—New Plant.—The Electricity Committee is seeking sanction to install a new 6,000-kW generating set at the Newton Abbot power station.

Tunbridge Wells.—Loan Sanctioned.—The Town Council has received sanction to a loan of £16,847 for electricity purposes. Of this sum £14,400 is to be expended on works and distributing mains, and £2,447 on sub-station equipment and switchgear.

Ulverston.—Sinking Fund Suspension.—At a recent meeting of the Urban District Council, the Electricity Committee recommended that application be made to the Electricity Commissioners to postpone for a period of two years the payment of the sinking fund in connection with the loans sanctioned by them.

Wakefield.—Loan Sanctioned.—The Electricity Committee has obtained sanction to a loan of £10,000 for sub-station equipment.

New Electricity Charge.—The Committee has decided that domestic consumers who so desire shall, except where electricity is supplied through prepayment meters, be charged at the following rate:—17½ per cent. of the net rateable value of the premises per annum, plus ¾d. per kWh consumed, the price per kWh to be 1d. until the price of coal returns to normal.

Walton-le-Dale.—Inauguration of Supply.—The Urban District Council's electricity scheme was formally inaugurated on October 6th, when a number of street lamps, which the Lancashire Electric Power Co. is converting from gas to electricity on the Council's behalf, were switched on. There are 300 gas lamps in the district, and the conversion to electricity will save approximately £200 a year.

West Somerset.—Electricity Supply.—The Minehead Electric Supply Co., Ltd., intends to apply for an Order authorising it to extend its area of supply to other parts of West Somerset, including Watchet and the whole of the Williton rural district. At a recent meeting of the Watchet Urban District Council a suggestion was put forward for the development of a small plant in the town owned by Mr. W. E. M. Chidgey. Before coming to any definite decision, however, it was decided to ask the Electricity Commissioners' advice and to inquire whether Minehead was to become a distributing centre under the national electricity development scheme. The proposal of the Minehead Company was also discussed by the Williton Rural Council at a recent meeting, when a resolution was passed declining to support any monopoly and expressing objection to the erection of overhead wires.

Whitby.—Loans Sanctioned.—The Urban District Council has received sanction to loans of £1,000 for mains and services, and £100 for domestic apparatus to be let out on hire.

Winchester.—Year's Working.—The report of the city electrical engineer (Mr. R. Ayton) on the working of the electricity undertaking for the year ended March 31st last records a total income of £33,777, as compared with £32,989 in the previous year. Working expenses amounted to £22,545, as against £21,678, leaving a gross profit of £11,232 (£11,311), to which was added bank interest of £231, making a total of £11,463. Capital and other charges absorbed £9,736, and there was a net surplus of £1,727, as compared with £2,212 in 1924-25. This was transferred to reserve, which now stands at £15,836. There was a slight decrease in sales of electrical energy from 2,009,986 to 1,941,926 kWh, but the maximum supply demanded increased from 1,001 to 1,052 kW.

Loans Sanctioned.—The City Council has received sanction to loans of £4,000 for mains and services and £1,500 for meters. A sum of £250 is to be expended on the purchase of cookers to be let out on hire.

Tramway and Railway Notes.

Burton and Ashby.—Light Railway Abandonment.—It is announced that the Ashby light railway, owned by the L.M. and S. Railway Co., which has been in operation for 20 years, and runs between Ashby-de-la-Zouch and Burton-on-Trent, a distance of 11 miles, is shortly to be closed.

Continental.—Spain.—According to *The Times Trade and Engineering Supplement*, the Norte Company is planning important improvements to its system. These consist of the completion of double tracks on the main lines and the electrification of sections where the gradients are steepest and long tunnels exist. The double tracks to be laid are Avila-Medina (51 miles), Miranda-Medina (46 miles), Játiba-Encina (34 miles), and Valencia-Castellon (41 miles). The first two sections are on the main Hendaye-Madrid line and the last two have become necessary owing to the development of the Valencia agricultural region. The estimated cost of the electrification programme is 194 million pesetas.

Switzerland.—The electrification work on the Brugg Pratteln section of the Swiss Federal Railways is so far completed that trial runs are to be made shortly, and it is expected that an electric service will be in full operation on November 1st.

Hull.—Reinstatement of Employés.—*The Times* reports that the City Council has passed a resolution instructing the Tramways Committee to make arrangements for the reinstatement of all employés not re-employed since the general strike. These employés number approximately 200.

Liverpool.—Tramway Tunnel.—It is reported that the Tramways Committee of the City Council has under consideration a scheme for the construction of a tramway tunnel under Everton Hill to permit of further tramway extensions.

London.—L.C.C. Tramway.—In its report on the county rate for the half-year to March 31st, 1927, the Finance Committee of the L.C.C. states that the net deficiency on the working of the tramway for six months ended September 30th, 1926, is now estimated at £150,000. This deficiency can be met by the Special County Account without increasing the rate, owing to the balance on the account at the beginning of the year being now estimated at £142,000, as compared with the original figure of £6,000. This greatly improved position is due to the fact that the tramway deficiency for 1925-26 proved to be £114,629, as compared with the revised estimate of £252,582, the largest item accounting for the difference being the income tax adjustment for earlier years.

Walthamstow.—Track Renewals.—The Urban District Council has applied to the Ministry of Transport for sanction to a loan of £45,000 for the reconstruction of a portion of the tramway track.

West Hartlepool.—Extension of Depot.—The Town Council has decided to extend the tramway depôt at an estimated cost of £3,500.

United States.—Cleveland.—The *Electric Railway Journal* states that the Cleveland Subway Co. contemplates the construction of a subway for the west and south-west of the city, as well as for the east and south-east. The cost of construction is estimated at less than $4,000,000 per mile, and the Cleveland Railway has indicated that it would be prepared to lease and operate the subway after it had been constructed.

Whitby.—Cliff Tramway.—At a recent meeting of the Urban District Council it was decided not to proceed with the scheme for the construction of a cliff tramway, the cost of which is estimated at £9,000, but to ascertain terms upon which private enterprise would be prepared to carry out the scheme and operate the tramway.

Telegraph and Telephone Notes.

"Beam" Radio-Telegraphy. — STATION TESTS. — The "beam" radio-telegraph stations which Marconi's Wireless Telegraph Co., Ltd., is building in England for Imperial communication are nearing completion. They will be operated by land line from the Central Telegraph Office in London, and will be required to work daily for 18 hours with Canada; for 11 hours with South Africa; for 12 hours with India; and for 7 hours with Australia. It is understood that the stations at Grimsby and Skegness for the India and Australia services will be ready for their preliminary tests in November, whilst the transmitting plant at Bodmin, Cornwall, and the receiving station at Bridgwater, Somerset, for the Canada and South Africa services will undergo their official demonstration within the next few weeks. They will cost £100,000, and the Marconi Co. will have to demonstrate, by actual working for seven days, that they fulfil the demands of the Post Office authorities. When the latter takes the stations over half their purchase price will be paid to the company; after six months' satisfactory operation a further quarter will be paid, and the remaining quarter six months later.

A Melbourne message states that unsatisfactory reports have been received by the Australian Postal Department of the Canadian "beam" trials, and the work of erecting the Australian station is being delayed pending definite results in Canada. The first Australian trials had been fixed for this month, but will now be considerably delayed, says the *Financial News*, and in view of the experience in Canada it is considered improbable that the Australian station will be able to compete with cables for some time.

Brazil.—PRESS RADIO STATION.—The Brazilian Government has given permission for an organisation called the Brazilian Press to be formed for the purpose of receiving and distributing messages, as well as maintaining and utilising a radio station exclusively for this purpose.—*Reuter's Trade Service* (Rio de Janeiro).

Electric Storm.—CABLE TELEGRAPH DELAY.—A severe electric storm made itself felt on October 15th and hampered the transmission of cable telegraph messages between Great Britain and North and South America. The inland telegraph service is also declared to have been affected during the night. The aurora borealis was observed in the northern part of the United States during the night of October 14th. Simultaneously trouble was reported by telegraph companies, and the effect of the storm was also felt throughout the Orient, but less severely than in the West. Observation of the aurora borealis in this latitude is unusual.

France.—AUTOMATIC TELEPHONY.—After the last Ministerial Council it was announced that automatic telephones would be adopted for Paris. The Secretariat-General of Posts, Telegraphs, and Telephones now announces that, in conformity with a report of M. Bokanowski, the Government has decided that work in connection with the conversion shall be begun immediately. The first part of the programme includes the supply of apparatus to serve 40,000 subscribers; five new buildings have already been constructed, and it is expected that this first section will be inaugurated in 1929. The work will be carried on until the whole of the Paris telephone system has been transformed, which will take ten years. The new apparatus will be constructed entirely in France and installed by French workers.—*Reuter* (Paris).

Radio Telegraphy.—NEW NAVAL STATION.—A new wireless station is, it is understood, to be established at Mablethorpe, Lincs., for ordinary naval and shore work. When complete it will replace the present temporary Humber station.

The Telephone Service.—NEW LONDON EXCHANGE.—There was a switch-over of subscribers on October 16th, when approximately 2,300 at present connected to the Battersea exchange and 2,000 whose call prefix is now "Latchmere" were connected with a new exchange which has been built in Altenburg Gardens, Lavender Hill, in consequence of the increase in the number of subscribers in the Wandsworth, Battersea, and Clapham districts, provision having been made for 6,300 lines. Those now served by the Latchmere exchange, which will cease to exist, will continue to use their present number, with the Battersea prefix. The new exchange will deal with about 23,500 outgoing and 20,600 incoming calls during a day.

NEW BIRKENHEAD EXCHANGE.—A new manual exchange at Upton, Birkenhead, in the Liverpool telephone area, was cut into service on October 9th. The equipment, which is of the No. 10 C.B. type, was manufactured and installed for the Post Office by the Automatic Telephone Manufacturing Co., Ltd. The equipment comprises six two-panel switchboard sections and a cable-turning section, affording accommodation for six operators in all, and also a one-position supervisor's desk, to deal with approximately 300 subscribers.

Trans-Pacific Radio Service.—REDUCED NEWS RATES.—An agreement has been reached between the American Radio Corporation and the Japanese Government for lower Trans-Pacific wireless Press rates, to become effective on November 1st. European companies concerned have not yet replied to Japan's proposals.—*Reuter* (Tokio).

Radio Notes.

Czecho-Slovakia.—DEVELOPMENT OF WIRELESS.—The number of wireless subscribers increased by 700 per cent. between January 1st and September 1st this year. Several training schools have installed stations, the use of which is shared by the other establishments. The Ministry of Education is beginning to interest itself officially in the development of broadcasting, and has included in this year's Budget a sum of 100,000 crowns for the purchase of apparatus.—*Reuter's Trade Service* (Prague).

Greece.—SEVERE REGULATIONS.—At present there is no broadcasting service in Greece, and, owing to the severe conditions imposed with regard to the erection and working of wireless sets, there are very few private stations. The wireless laws of February and December, 1924, embody two forms of permits, says *World Radio*: one for amateurs for tests with transmitting and receiving sets working under 300 metres with a range of 30 kilometres, issued by the naval authorities, who subject the set to a thorough examination. The cost of such a permit amounts yearly to 50 francs. The second kind of permit refers only to receiving sets, and only plant which does not oscillate is allowed; only frame aerials can be used, and the set must not go beyond 2,000 metres wave-length. Permits can only be held by Hellenic citizens.

Hayti.—NEW STATION.—The following is an extract from the August *Bulletin* of the Republic of Hayti, which has been forwarded to the Department of Overseas Trade by His Majesty's Chargé d'Affaires at Port-au-Prince: "One of the most interesting projects undertaken by the Direction Générale is the radio broadcasting station which was completed in August with gratifying results. The Direction Générale is in receipt of a very great number of complimentary communications from receiving stations which have been able to hear station 'HHK' at Port-au-Prince. The station is of 1,000 watts capacity and it has been heard in Colorado, Florida, Georgia, Connecticut, Porto Rico, Dominican Republic, Venezuela, and many other places. The work of installing receiving sets at various places throughout the Republic is now underway and, although regular programmes have not as yet been arranged, it is expected that within a very short time they will become regular."

Holland.—NEW STATION.—The Government Telegraph and Telephone Authorities contemplate the erection of a radio-telephone transmitter which will be at the disposal of business people who wish to make announcements, at a moderate tariff. Tests have been made from Scheveningen Harbour, according to *World Radio*, from which it appears that with 3-kW aerial energy sufficient power can be generated to reach all parts of Holland without disturbing other stations on a 1,950-m. wavelength. The tests are to be resumed at the beginning of November.

Wave-length Redistribution.—CAUSE OF DELAY.—The cause of the delay in the introduction of the new European wave-lengths, as allotted to the different countries by the Office Internationale de Radiophone, Geneva, is the desire to ensure accuracy, without which the plan would be useless. Capt. P. P. Eckersley, chief engineer of the B.B. Co., points out in the *Radio Times* that, theoretically, and to avoid stations using the same wavelength heterodyning each other, the accuracy of adjustment of individual stations should be of the order of 20 parts in a million; actually, however, the wave meters will be accurate to 300 parts in a million, a higher degree not being practicable. The metres were designed by the International Technical Committee and worked out in detail by MM. Braillard and Divoire, of the Belgian administration; the master wavemeter and other instruments (which will be sent to every European country), which will be calibrated with it, are being constructed in Belgium and have taken longer to make than was anticipated; hence the delay.

Contracts Open and Closed.

(The date given in parentheses at the end of the paragraph indicates the issue of the "Electrical Review" in which the "Official Notice appeared in our advertisement pages.)

Open.

Atherton.—November 2nd. Urban District Council. 2,350 yd. h.p. cable. (See this issue.)

Australia. — MELBOURNE. — November 3rd. Postmaster-General's Department. Pole transformers. (B.X. 2914.)* Pole-changing transformers. (B.X. 2915.)*

Belgium.—October 27th. The Belgian Post and Telegraph Authorities at 1 a Salle Madeleine, Brussels. Five lots of lead-covered paper-insulated cables. Particulars (Cahier des Charges Special No. 1-24) for 3 fr. 15 c.

Bury.—October 25th. Board of Guardians. Electro-massage and X-ray departments at Bury Infirmary. Particulars from Mr. A. C. M. Lillie, architect, Brownedge, Bamber Bridge, Preston.

Dublin.—November 8th. Dublin United Tramways Co. (1896), Ltd. Stores for 12 months, including electric lamps, electrical fittings, &c. (See this issue.)

Eastbourne.—November 5th. Electricity Department. One water-tube boiler, economiser, feed heaters, two steel chimneys with induced-draught plant, interconnecting pipework, &c. (October 8th.)

Edinburgh.—October 25th. Education Authority. Electrical work at additions to Hermitage Park School, Leith. Schedules from Mr. T. Aikman Swan, architect, 7, St. Colme Street, Edinburgh.

India.—October 29th. India Store Department. 32,100 yd. l.p. cable, joint and house service boxes. November 1st. 5,000 yd. armoured cable. (See this issue.)

London.—METROPOLITAN ASYLUMS BOARD.—November 3rd. Installation of automatic telephones and fire alarms and alterations to electric lighting installation at the North-Eastern Hospital, St. Anne's Road, Tottenham, N. (See this issue.)

PADDINGTON.—November 19th. Great Western Railway. Stores, including telegraph instruments, electrical apparatus, electrical wires and cables, &c. (See this issue.)

New Zealand. — WELLINGTON. — December 7th. Public Works Department. Induction regulator. (B.X. 2935.)*

January 4th, 1927. Switchgear and transformers for the Waikaremoana electric power scheme. (B.X. 2872.)*

February 1st, 1927. Storage battery and booster for Waikaremoana. (B.X. 2967.)*

December 15th. Government Railways. Switchgear, cable, motor-generator sets, junction boxes, &c., for the Hutt Valley locomotive workshops. (B.X. 2949.)*

Otley.—October 28th. Urban District Council. Electricians' work required in erection of 78 houses, Harefield. Particulars from surveyor, Council offices.

South Kirby.—Electric lighting installation, South Kirby Church. Vicar, South Kirby Vicarage, near Pontefract.

Stoke-on-Trent.—November 10th. Electricity Department. E.h.p. switchgear for central power house, e.h.p. switchgear and moulded stone for Stoke sub-works, and neutral earth resistance for central power house. (October 15th.)

South Africa.—PORT ELIZABETH.—November 25th. City Engineer's Department. Duplicate electrically-driven automatic centrifugal pumps, including piping, &c., for sewage pumping. (A.X. 3680.)*

Stirling.—October 25th. Town Council. Electrical work at Burnside housing scheme. Schedules from Burgh Engineer.

Switzerland.—October 30th. General Direction of the Swiss Federal Railways in Berne. Supply and installation at the Biel transformer station of four single-phase a.c. 3,000-kVA transformers, together with the necessary 60-kV switchgear, &c. Particulars for 5 fr. from the Abtheilung für Elektrifizierung, Dienstgebaude, 43, Mittelstrasse, Berne.

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Closed.

Australia.—MELBOURNE.—State Electricity Commission of Victoria.

Switchgear.—Metropolitan-Vickers Electrical Co., Ltd. (£17,042); General Electric Co. of U.S.A.—(£28,675).
6 transformers (£22,094).—Gibson, Battle (Melb.) Pty., Ltd.
6 turbo-generators (£81,484).—Boving & Co., Ltd.

SYDNEY.—New South Wales Railways.

50 electric-car motor bogies (£24,350).—Clyde Engineering Co., Ltd.

—Tenders.

Bradford.—Tramways Committee.

116 steel tires for tramcar wheels (£368).—John Brown & Co., Ltd.
50 steel axles for tramcars (£300).—Vickers, Ltd.

Chesterfield.—Town Council.—Accepted:—

14 trolley-vehicle bodies (£6,337).—Reed & Kenning, Ltd.

Chippenham.—Isolation Hospital Committee. Accepted:

Installing electric lighting at the hospital.—A. R. Fox.
Extending the mains to the hospital.—West Wilts. Light and Power Co.

France.—PARIS.—It is reported from Paris that the contract for the conversion of the Paris telephone network to the automatic system has been given to a French company. All the works connected with the contract are to be carried out in France, so that this statement, which has been confirmed by the Minister of Commerce, disposes of the reports that a German company would have a share in the orders.

Gravesend.—Electricity Committee. Recommended:—

Transformer (£290).—British Electric Transformer Co.

Hull.—Telephones Committee. Accepted:—

Bronze wire (£273).—F. W. Dennis & Co.
Rubber-covered wire (£109).—W. T. Henley's Telegraph Works Co., Ltd.

Electricity Committee.

l.p. cable conduit:—

H. Sugden, Son & Co. (Accepted.)	**£920**
R. Tarran	1,050
Holiday & Barker	1,100
E. Quibell & Son, Ltd.	1,154
A. E. Jones (Hull), Ltd.	1,190
Hinch Bros., Ltd.	1,638
Kettlewell, Son & Co.	1,697

Lichfield.—Board of Guardians. Accepted:—

Electric wiring and fittings.—Richards & Co.

London.—PORT OF LONDON AUTHORITY.

Six months' supply of "Osram" gasfilled electric lamps.—General Electric Co., Ltd.

WESTMINSTER.—Baths Committee.

Re-wiring Great Smith Street baths:—

Coleby & Co. (Recommended.)	**£274**
Buchanan & Curwen	341
Rashleigh, Phipps & Co.	429
Belshaw & Co.	483

STOKE NEWINGTON. — Electricity Committee. Recommended:—

Cables.—W. T. Henley's Telegraph Works Co., Ltd.
Meters.—Reason Mfg. Co., Ltd.; Measurement, Ltd.; Ferranti, Ltd.

LONDON COUNTY COUNCIL.—Stores and Contracts Committee. Accepted:—

Electrical fittings for 12 months.—Baxter & Caunter, Ltd.; British Central Electrical Co., Ltd.; British Electrical & Mfg. Co.; Edison Swan Electric Co., Ltd.; W. McGeoch & Co., Ltd.; Metro-Vick Supplies, Ltd.; G. S. Peckham & Co.; Walsall Hardware Mfg. Co., Ltd.
Insulating materials for 12 months.—L. Andrew & Co.; Attwater & Sons; Butterfield & Renton; Dacier, Ltd.; Hammett & Andrew; Ioco Rubber and Waterproofing Co., Ltd.; Mica Mfg. Co., Ltd.; Rubber Industries, Ltd.; G. L. Scott & Co.; Siemens Bros. & Co., Ltd.; H. D. Symons and Co., Ltd.

Newport (Mon.).—Works Committee. Accepted:—

Automatic internal telephone installation at Town Hall.—South Wales and Monmouthshire Telephone (New System) Co., Ltd.

Electricity Committee. Accepted:—

Semi-portable drainage pump (£166).—C. D. Phillips, Ltd.

Portsmouth.—Electricity Committee. Recommended:—

Duplicate turbo-alternator (£28,505).—Fraser & Chalmers Engineering Works.

Shanklin.—Urban Council. Accepted:—

Installing electric lighting at the public offices, the surveyor's office, &c.—Isle of Wight Electric Light and Power Co.

Torquay.—Town Council. Accepted:—

Mechanical screening plant, Newton Abbot power station (£2,212).—Brackett & Co., Ltd.

Winchester.—Town Council. Accepted:—

Two new batteries for the electric dust carts (£389, less £32 allowance for the old batteries).—Tudor Accumulator Co., Ltd.

Worthing.—Town Council. Accepted:—

Cables for supplying electricity to Goring-by-Sea and Rustington (£16,474).—Callender's Cable and Construction Co., Ltd.

Forthcoming Events.

Institution of Mechanical Engineers.—Friday, October 22nd. At the Institution, Storey's Gate, S.W. At 6 p.m. Presidential address by Mr. W. Reavell.

Junior Institution of Engineers.—Friday, October 22nd. At 39, Victoria Street, S.W. At 7.30 p.m. Lecturette on "Boiler Accidents," by Mr. R. H. Kenyon.

Friday, October 29th. Lecturette on "Distortion in Wireless Reception," by Mr. A. V. Ballhatchet.

Manchester Association of Engineers.—Friday, October 22nd. At the Engineers' Club, Manchester. Inaugural address by the President, Sir Benjamin Longbottom.

Institution of Electrical Engineers.—INFORMAL MEETING.—Monday, October 25th. At the Institution, Victoria Embankment, W.C. At 7 p.m. Discussion on "Does Heavy Current or Light Current Electrical Engineering Afford the Greater Scope to Young Men with Electrical Engineering Ability?" to be opened by the President.

(Mersey and North Wales (Liverpool) Centre).—Monday, October 25th. At the University, Liverpool. At 7 p.m. Address by the chairman, Mr. P. J. Robinson.

(North-Eastern Centre).—Monday, October 25th. At Armstrong College, Newcastle-on-Tyne. At 7 p.m. Address by the chairman, Mr. J. Rosen.

Electric Lamp Manufacturers' Association.—Monday, October 25th. At the Lighting Service Bureau, 15, Savoy Street, W.C. At 7 p.m. Lecture on "Simplified Methods of Designing Illumination Schemes," by Mr. W. Milner.

Institution of Civil Engineers.—Tuesday, October 26th. At the Institution, Great George Street, S.W. At 6 p.m. James Forrest Lecture on "Radio Communications," by Senatore G. Marconi, and presentation of the Kelvin Medal, 1926, to Sir Chas. Parsons, F.R.S.

Illuminating Engineering Society.—Tuesday, October 26th. At the Lighting Service Bureau, 15, Savoy Street, Strand, W.C. At 6.30 p.m.. Opening meeting.

Faraday Society.—Wednesday, October 27th. At Burlington House, W. At 8 p.m. Ordinary Scientific Meeting.

Faraday House Old Students' Association.—Friday, October 29th. At the Hotel Cecil, Strand, W.C. At 6.30 p.m. Annual dinner.

Society of Technical Engineers.—Friday, October 29th. At the Queen's Hotel, Birmingham. At 7.30 p.m. Address on "The Engineers' Bill," by Mr. R. Hazleton.

Finsbury Technical College Old Students' Association.—Saturday, October 30th. At the Engineers' Club, Coventry Street, W. Annual dinner.

The "Electrical Review" Service Department.

INQUIRIES must be accompanied by a stamped addressed envelope.

We should be glad to learn the names and addresses of makers of the following:—

A curling iron heater which cuts off current when iron is withdrawn.

A British made iron which breaks circuit when too hot.

An electric potato chipping machine.

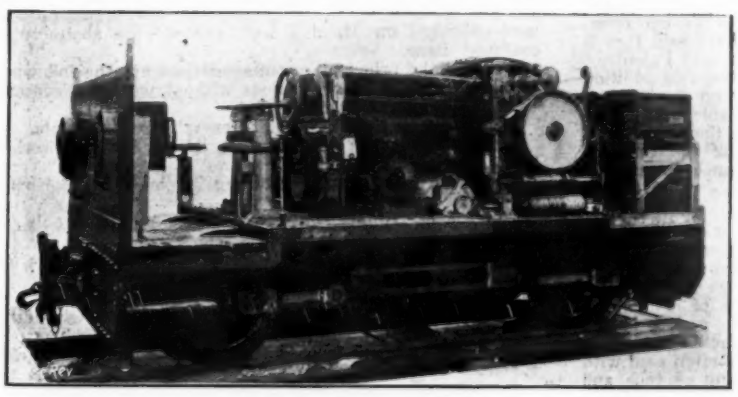
LAUNDRYETTE washers.

Notes.

London Traffic Inquiry.—A public inquiry was commenced on October 11th and continued on subsequent days at the Middlesex Guildhall, Westminster, by the London and Home Counties Traffic Advisory Committee into the travelling facilities of South-East London, during which the construction of a shallow tube railway at an estimated cost of £4,000,000 between the Mansion House and Lee Green was suggested by Mr. E. C. Kearney. The inquiry was adjourned until October 28th.

Box-making by Electricity.—A new box-making factory, to accommodate about thirty machines, is being erected by Messrs. William Fiddes & Son, Ltd., Aberdeen. All the box-making machines will be fitted with individual electric drives. The firm is generating its own electricity and a new electrically-propelled plant for exhausting the sawdust and delivering it to the furnaces is also being installed.

An Austrian Ore-carrying Railway.—In a recent issue we gave some particulars of the electrically-operated cable railway which the Alpin Montan Gesellschaft has had constructed for the rapid conveyance of miners from the valleys to the iron-ore mines towards the summit of the Erzburg mountain in Styria. The Company has also recently completed an electric rack railway for the conveyance of iron ore from the open workings near the top of the mountain to the storing and dispatching depot at Hintererzberg in the valley below. The line is interesting in that on the downward journey the braking effort is utilised for regeneration, the power returned to the line being sufficient to propel a train of empty trucks back again up the mountain. The trains comprise, in addition to the locomotive, ten trucks of a total weight when loaded with ore of 100 tons, the weight of the empty train being 40 tons. The maximum gradient on the line is 5 per cent., or 1 in 20, and the normal travelling speed is 5 miles per hour. The line has a gauge of 3 ft., and is provided with a single centrally-located rack, 2 in. wide, with teeth of 120 mm. pitch. The electric locomotives are provided with two adhesion-wheel axles and two rack pinion axles, all four axles being connected together on one side by coupling rods. The adhesion wheels have a diameter of 27½ in., while for engagement with the rack 18-tooth sectors are used in place of full pinions. The rack sector axles are set at a distance of 40 in. apart, while the distance between centres of the adhesion wheel axles is 8 ft. 2 in., the overall length being 14 ft. 5 in. The service weight of the engines is 14 tons. The line is operated by 500 V direct current, supplied from a light overhead conductor supported on masts located on one side of the track. The electrical equipment comprises, in addition to the motor having



Electric Rack Locomotive.

a continuous capacity of 150 h.p., an exciter-transformer and a small generator which is compounded by means of the working current from the driving motor, an arrangement which is claimed to give a high degree of flexibility of running to the engine, enabling it to compensate for any slight voltage variation in the overhead line and also reducing the wear on the trolley contacts. The motor drives one of the toothed sector axles through a countershaft and gearing, the latter being mounted on the side of the engine opposite to the coupling rods. The gearing, in which a clutch is introduced, has a ratio of 12.1 to 1. In addition to the braking effort resulting from the recuperation arrangement, which is stated to be capable of returning 90 kW to the overhead conductor, two independently-operated brakes are provided on the rack sector axles and a powerful band brake on the motor spindle, the latter being so arranged that when applied the current is automatically cut off. The mechanical parts of the engines were built by Krauss & Co., of Linz, and the electrical equipment by the A.E.G.-Union Elektrizitats Gesellschaft, of Vienna.

I.E.E. Wiring Regulations.—For the last two years the I.E.E. Wiring Rules Committee has been considering the comments and criticisms which were made as a result of the issue, in July, 1924, of the eighth edition of the Wiring Regulations, and the Council has recently adopted a recommendation of the Committee that a revised edition of the Regulations be published as early as possible next year, embodying a number of alterations with a view to bringing the regulations up to date; removing certain difficulties which have arisen in practice in complying with the Regulations; and amending the wording of some of the Regulations so as to render their meaning clearer. A few amendments, particularly the revised current-carrying capacities of flexible cords and cables, are, however, considered by the Committee to be of such importance as to warrant their immediate publication, and the Council has therefore decided to issue immediately a revised Alterations and Additions Pamphlet, which also includes the alterations issued in July, 1925. Copies of the pamphlet can be obtained free of charge on application to the secretary.

de Forest "Phonofilms."—A remarkable situation has arisen over "Phonofilms," the "talking films" to which reference is made in our leading columns. There are two companies, a British one, with a capital of £50,000, headed by Sir George Hamilton, and an American concern, headed by Dr. Lee de Forest, the inventor of the process. The British company owns the whole of the British Empire rights, excluding Canada, and the American company owns the rights for all the rest of the world. The success of the London demonstration of the invention has been so great that Mr. William Fox, an American kinema magnate, has offered the American and British companies £250,000 each for sale outright of the process, coupled with a suggestion that if they do not accept the offer he will compete against them with an invention called the "Tri-Ergon," says the *Daily Express*, which explains that the British company has refused the Fox offer, despite the fact that it is equivalent to £5 per £1 share, and the American company, it is understood, has adopted the same attitude.

The Shannon Scheme.—In a letter from Mr. F. Allen, Secretary of the power section of the Irish Free State Ministry of Industry and Commerce, to Kilkenny Corporation, it is stated that the transmission lines in connection with the Shannon hydro-electric scheme will be commenced in about a month and that it is hoped to have them completed by April next. The first section of the lines will run from Dublin through the counties of Dublin, Wicklow, and Wexford to Waterford, the return lines to Dublin passing through Kilkenny, Carlow and Maryborough. Arrangements have been made for a temporary supply to these and other centres, and if Kilkenny Corporation wishes to take advantage of the service for public lighting purposes, it will be necessary to arrive at a decision at an early date.

New Lighting System.—More and better lighting is now the vogue in most places of worship, and a particularly fine example is to be seen at the Essex Unitarian Church, Kensington. The system employed is claimed to be unique in that it combines the use of "Gecoray" reflectors, mounted in decorative units, with auxiliary lamps for use when the main reflector lamps are switched off. The units were specially designed by the General Electric Co., Ltd. The lanterns are made of oxidised brass, with side panels and bottom glazed with a diffusing glass of low absorption to eliminate glare from the light source. The "Gecoray" reflector in the interior of each fitting is equipped with 150-W "White Osram" gasfilled lamps and concentrates the light downwards through the diffusing glass at the bottom, the fittings being fixed at the requisite height to evenly distribute the light over the pews and avoid objectionable shadows. The auxiliary lighting is obtained from three 40-W "White Osram" lamps fitted inside the lantern around the outside of the reflector, illuminating through the side panels the walls of the church. They are controlled on a separate circuit so that during the sermon the main lighting from the reflector may be switched off, leaving the auxiliary lamps to give a lower intensity of illumination throughout the church. The advantages of this system of lighting are manifold: The lanterns, suspended at a height of 22 ft. from the floor level, are well above the line of vision from the pews and permit the whole of the seating accommodation to be illuminated by a well diffused light of even intensity with an absence of harsh shadows on books or music sheets. All the light sources are entirely enclosed and protected from the accumulation of dust, thereby reducing the maintenance cost to a minimum. The installation was carried out by Messrs. Herbert Nash, electrical contractors, under the direction of the architect, Mr. Ronald P. Jones.

Fatality.—A verdict of "Accidental death" was returned on October 14th, at an inquest on the body of Ralph Leany Oldfield (20), of Cheriton, near Folkestone, who received a fatal electric shock at the Rugby wireless station on October 11th. A workman stated that he saw Oldfield inside the h.p. machinery enclosure, and advised him to come out. Oldfield collapsed shortly afterwards. The assistant engineer (Mr. C. O. Horne) stated that Oldfield had no business to be within the enclosure. He could not suggest why he was there. The door of the enclosure, the key of which was kept in the office, could not be opened unless the machinery was stopped. It was possible that Oldfield climbed over to adjust the plug of the heating radiator. A warning against the danger of entering was posted on the enclosure.

The Durban Mine Disaster : Electricians Killed.—Duncan Maclachlan (36), of Paisley, one of the victims of the disaster at Durban Navigation Mine, had been employed as head electrician at the mine for about a year. Mr. Marshall, late of Salsburgh, Lanarkshire, who lost his life, was also an electrician.

Electrical Association for Women.—At the special request of Dame Henrietta Barnett (vice-president of the E.A.W.), the E.A.W. has arranged the following series of lectures for the Hampstead Garden Suburb Institute :—

Thursday, October 14th.—"Practical Hints on Electric Cookers," by Miss A. R. Bisset.

Thursday, November 11th.—"What is Electricity?", "Simple Household Repairs in the Home," "Washing Machines," &c., by Mr. J. C. Jeary.

Thursday, December 9th.—"Scientific Home Lighting," "Eye Strain," by Miss Florence Hodge.

Thursday, January 13th.—"Electric Transport," by Mr. G. S. Francis.

Thursday, February 10th.—"Electricity in Other Countries," by Mr. G. S. Francis.

Thursday, March 10th.—Concluding Meeting. Miss C. Haslett, Director of the Electrical Association for Women, will speak.

A branch of the Association is being formed in Manchester, and a public meeting is to be held for this purpose in the Lesser Free Trade Hall, Manchester, on October 26th. The speakers will include Miss Ellen Wilkinson, M.P., Dr. S. Z. de Ferranti, and Miss C. Haslett. A number of subsequent lectures and visits have been arranged. The hon. secretary for the Manchester branch is Miss G. L. Entwisle, A.M.I.E.E., 5, Holmefield, Sale, Manchester.

Inquiry at Chiswick.—An inquiry was opened at the Chiswick Town Hall on October 5th, and continued on subsequent days, by Mr. G. L. Pepler, for the Ministry of Health, into the application of the Chiswick Urban District Council for sanction to amend its town-planning scheme so as to exclude from it 45 acres of Duke's Meadows, upon which the London and Home Counties Joint Electricity Authority proposes to erect a power station to serve the western part of its area. Opposition to the proposal was made by the Barnes Urban District Council and private residents, who stated that the amenities of the river on the south side would be seriously menaced by the erection of the new station. The inquiry, which was adjourned on October 12th, was to have been continued on October 19th. A second inquiry will be held by the Electricity Commissioners if the Ministry of Health sanctions the alteration to the town-planning scheme.

The Inventions Exhibition.—The fourth International Exhibition of Inventions was opened at the Central Hall, London, on October 13th. Declaring the exhibition open, Lord Askwith is reported by *The Times* to have said that it was the fourth so far arranged by the Institute of Patentees. This year there was an increase of 120 inventions, in addition to 80 stallholders showing inventions already on the market. The fact that in four years they had been able to increase exhibits from 150 to over 2,000 showed that there was need for the institute. Lord Askwith, president of the Institute of Patentees, afterwards presided over a luncheon at the Connaught Rooms, at which Sir William Joynson-Hicks, Home Secretary, spoke.

Local Societies.—QUALITY IN RADIO RECEPTION.—Some of the causes of distortion in wireless receivers were examined by Mr. N. W. McLachlan, M.I.E.E., in a lecture on "Quality in Reception," which he delivered recently at Birmingham. There was still, he said, a marked difference of opinion regarding the respective merits of anode-bend and grid-leak rectification, but he thought the grid-leak method owed its bad reputation chiefly to the fact that it was so often used with reaction, which was responsible for a muffling of tone and cutting-off of the high frequencies. With a receiver using a detector, one stage of resistance-capacity amplification, and one of l.f. transformer coupling, tests were carried out to show how the use of unsuitable valves and loud-speakers with a correctly designed set might cause considerable distortion. The use of the right type of valve was particularly necessary in the output stage, where the use of a valve with too high a resistance would diminish the higher frequencies and lower the volume. Grid bias was an important matter, and it was shown how the reduction of the applied voltage here would give rise to harsh, rasping reception. It was important, also, to use an adequate voltage on the plate of the output valve, especially if a power valve were used. Too low a potential would cause not only a falling-off in volume, but considerable distortion also. This was often a cause of distortion, because listeners sought to economise by buying h.p. batteries which were too small.

The Batti-Wallahs' Society.—On Wednesday last week, the Society held a re-union luncheon at the Hotel Cecil; the president, Mr. A. W. Blake, was in the chair, and Sir William Bull, Bt., P.C., M.P., was the principal guest. Addressing the gathering after lunch, Sir William said he would like to ask them a lot of questions about the Electricity Bill; this was an individualistic nation, and he thought the less the Government interfered with its affairs, the better. The main subject of his discourse, however, was "The Influence of Architecture on Politics," and he explained the advantages of an oblong building over a circular one, as affecting party politics, in entertaining fashion, winding up with a series of amusing reminiscences from his Parliamentary career of a quarter of a century. Moving a vote of thanks to the speaker, Mr. G. W. Partridge, M.Inst.C.E., vice-president, expressed strong approval of Sir William's comments on the merits of individualistic enterprise.

The Electricity Bill and S.E. Lancashire.—Mr. A. H. Banks, clerk to the South-East Lancashire Electricity Advisory Board, writes :—"In the leader in your issue of the 15th instant you state that the above Board is prepared to 'give place to a J.E.A.' with the object of securing exemption from the national scheme. Also, in your 'Notes' on page 628 you do not make quite clear the result of the *Board's* deliberations on the report of the Special Committee. I think the matter of sufficient importance for me to point out that the proceedings of the Special Committee were simply *received*, and the Board did not adopt any resolution approving or disapproving of the findings of the Special Committee."

E.C.A. Apprentice Medals.—The gold, silver and bronze medals and money grants provided by the Electrical Contractors' Association for indentured apprentices (in the employ of member firms) who achieve distinction in the City and Guilds of London examinations have been awarded as follows : Gold medal and £20 to A. Campbell (Messrs. Reynolds and Bradwell, Birmingham), highest marks in first class final; silver medal and £20 to C. Blackburn (Messrs. Troup, Curtis and Co., London), highest marks in Grade 1; and bronze medal and £10 to S. F. Snow (Messrs. Marryat & Place, London), second highest marks in Grade 1.

Country House Lighting for Contractors. — The CHLORIDE ELECTRICAL STORAGE CO., LTD., has recently published a useful brochure for the assistance of contractors in connection with the lighting of large houses by self-contained generating sets. This enumerates most of the principal makes of set available and gives details of the "Exide" battery which best suits each type.

The B.E.A.M.A. Dinner.—The annual dinner of the British Electrical and Allied Manufacturers' Association will be held on Wednesday, November 17th, at 7.30 p.m., at the Connaught Rooms.

Appointments Vacant.—Scientific officer for research in connection with electrical ignition appliances (£485), for the Royal Aircraft Establishment, South Farnborough. Full-time lecturer in electrical engineering for the Chesterfield Technical College. Two junior engineers for the City of Portsmouth Electrical Department. Working foreman (£4), for the Borough of Newark Electricity Department. (See our advertisement pages to-day.)

Report of the Advisory Committee on Domestic Supplies of Electricity.—The report of the Advisory Committee appointed by the Electricity Commissioners to investigate questions relating to the domestic utilisation of electricity and the methods of charging therefor adopted or proposed was published on Monday last, and will be abstracted in our next issue.

Amongst the principal recommendations are the following :

Facilities to use overhead lines without particular consents.

Standard rates for wayleaves.

Relaxation of the Postmaster-General's requirements.

Authority to attach brackets to buildings to carry overhead lines, lamps, &c.

Simplified procedure for obtaining Special Orders for extensions, and fringe orders.

The use of simple multipart tariffs requiring only one meter.

Full trading powers to all local authority undertakers, and encouragement of hire and hire-purchase schemes.

Encouragement of assisted-wiring schemes.

Recognition of the legality of local authorities' expenditure on showrooms, publicity, &c.

Limitation of relief of local rates out of the electricity surplus.

Amendment of method of assessment for local rating.

The report can be obtained from H.M. Stationery Office, price 1s. net.

Institution Notes.

Institution of Electrical Engineers.—WIRELESS SECTION COMMITTEE.—The committee for the session 1926-27 comprises :—Prof. C. L. Fortescue, O.B.E., M.A., chairman; the president, I.E.E. (*ex-officio*); the chairman, I.E.E. Papers Committee (*ex-officio*); Major B. Binyon, O.B.E., M.A.; P. R. Coursey, B.Sc.; Capt. P. P. Eckersley; Lieut.-Col. A. C. Fuller, O.B.E., R.C.S. (nominated by the War Office); F. Gill, O.B.E. (nominated by the Council, I.E.E.); R. V. Hansford, D.Sc.; Major G. Harrison, R.M. (nominated by the Admiralty); Capt. N. Lea, B.Sc.; Lieut.-Col. A. G. Lee, M.C., B.Sc. (nominated by the Post Office); Lieut.-Col. H. P. T. Lefroy, D.S.O., M.C. (nominated by the Air Ministry); Prof. E. Mallett, D.Sc.; S. R. Mullard, M.B.E.; C. F. Phillips; Col. T. F. Purves, O.B.E. (representative of the I.E.E. General Purposes Committee); Capt. H. J. Round, M.C.; E. H. Shaughnessy, O.B.E.; G. Shearing; Commander J. A. Slee, C.B.E.

Society of Technical Engineers.—LONDON CHAIRMAN'S ADDRESS.—The London Central Branch of the Society held its opening meeting of the 1926-27 session on October 20th, when Mr. C. T. Inman, A.M.I.E.E., chairman of the branch, delivered an address on the present work and policy of the Society, remarking that its decision to keep itself independent

of all combinations of employers, or manual workers, which had come to be known as the third party policy, had lately been the subject of much controversy. The importance of this issue was beginning to be realised by public opinion. The Society was entirely non-political, but it welcomed the fact that the Conservative Party, at its annual Conference at Scarborough, had unanimously adopted a resolution in support of the third party policy in industry. They did not need to be reminded, he said, that the status and position of the average engineer were a good deal lower than they should be. The Society had come to the conclusion that the best way to meet the needs of the case was by a comprehensive measure of registration, and the Engineers' Bill now before the House of Commons was the outcome of that decision. On the whole, its reception by the House of Commons had been favourable. Some opposition on points of detail had come from the Labour benches, but it was expected that this could be met by suitable amendments, so that Labour opposition would probably be removed. They hoped to be able to get the institutions to examine their proposals in a friendly spirit and say what alterations they wished to have in the measure. An attitude of mere negation would not meet the case. The registration of engineers was already the law of the land in several countries, including Italy, the United States, and New Zealand. Sooner or later it would also come into force here, and the Society was anxious to see it sooner rather than later.

National Association of Supervising Electricians.—"ECONOMIC PREMIUMS."—The Board of Control has announced the second annual competition for prizes under the "Economic Premiums" scheme. The prizes have been increased this year, and, in addition to the £15 given by a past-president (Mr. F. Gill), £7 has been transferred from the N.A.S.E. Scholarship Fund inaugurated by another past-president (Mr. W. E. Highfield), making a total in prizes of £22. Cash prizes will be awarded for the four best papers dealing with economic problems; in addition, bound copies of the 1925-26 *Contact* given to writers of papers commended by the examiners.

Diesel Engine Users' Association.—OCTOBER MEETING.—A paper by Mr. Horace J. Young, F.I.C., entitled "A Note Upon the Obligation of the Ironfounder to Diesel Engine Users" was read and discussed, in which the author said that progress had been delayed by reason of the fact that the average ironfoundry was working on precisely similar lines to those used before Diesel engines were introduced. The engineer rather than the foundryman was to blame for the state of the foundries; the price offered for many ordinary castings had been, and still was, such as to reduce foundry work to the level of a "sweated" industry. The contention that ironfoundry men could not work to both composition and physical test was the exact opposite of the truth. Not a few engine builders possessing foundries were either having their important castings made outside, or were purchasing them abroad.

Our Personal Column.

(Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.)

The *Board of Trade Journal* announces that Mr. R. F. H. DUKE, C.B.E., has resigned his appointment as Commercial Secretary at Budapest. Communications should now be addressed to the Commercial Secretary, British Legation, 1, Verboczyutcza, Budapest I.

Mr. A. H. MCKAY, A.M.I.E.E., has been elected president of the Aberdeen Mechanical Society for the ensuing year, and at the opening meeting he lectured on "Some Notes on the Application of Electricity to Industrial Purposes."

Mr. FORBES W. SHARPLEY, B.Sc., A.M.I.E.E., lecturer on electrical engineering at the Lauder Technical School, Dunfermline, has been appointed Professor of Mechanical and Electrical Engineering at the School of Mines, Dhanbad, India.

The Harrogate Town Council on October 11th, decided to accept the resignation of Mr. WILKINSON, borough electrical engineer, as from December 31st next. His services will be retained for consultative purposes at a salary of 500 guineas a year for three years from that date.

Mr. J. P. BARCLAY has been appointed engineer-in-charge of the Electric Lighting & Power Co., Ltd., of Bagenalstown, King's County, Ireland.

M. C. M. CAMICHEL, the director of the Institut Electrotechnique of Toulouse, has been appointed an Officer of the French Legion of Honour. Among those who have just been elected as Chevaliers of the Order are M. A. TARRADE, the general secretary of the Société de l'Energie Electrique du Littoral Méditerraneen, M. R. HOCHSTETTER, the general director of the Société Alsacienne de Constructions Mécaniques, of Belfort; M. J. F. LHERIAUD, the chief engineer of the traction division of the Midi of France Railway Co.; M. G. ROBERT, the general secretary of the Société des Forces Motrices de la Loire, and M. J. M. MOIZIEU, the director of the Société de l'Energie Electrique du Lignon.

The Aberdeen University Court has appointed Mr. J. BIGGAR, B.Sc., and Mr. D. J. MCKELLAR, B.Sc., heads respectively of the mechanical engineering and electrical engineering departments in Robert Gordon's Technical College, as University lecturers.

By 16 votes to four, the Inverness Town Council has appointed Mr. C. A. GRUT as manager and engineer of the corporation electricity undertaking. It was stated that during the time that Mr. Grut had acted as interim manager he had shown himself to be in every way qualified for the post. The minority took the view that, before any appointment was made, the post should be duly advertised.

It is proposed by the Stoke Newington Electricity Committee that Mr. H. LARGE receive a special payment of £100 in respect of extra duty performed by him as acting borough electrical engineer between December, 1925, and May, 1926, during the absence of Mr. HANN on sick leave.

Obituary.—MR. G. CHAUVIN.—Mr. George Chauvin, whose death was announced in our last issue, began his connection with Messrs. Siemens Bros. in the year 1866, just 60 years ago. For a quarter of a century he was managing director of Siemens Bros. & Co., Ltd., and he retired from that position in April, 1925, on account of advancing age. He still, however, retained his seat on the board of directors. Mr. Chauvin was also on the boards of Caxton Electric Developments, Ltd., and the St. Helens Cable & Rubber Co., Ltd.

HERR C. LANGENFELD.—The death took place recently in Nuremburg, Germany, at the age of 72 years, of Herr Christian Langenfeld. The deceased became connected in 1884 with the Schuckert electrical engineering concern and established, and managed for many years, that company's department connected with the drawing up of electric lighting and tramway projects. He was responsible for undertakings in Germany, Norway, Hungary, Italy, and Belgium. On the amalgamation of the Siemens and Schuckert concerns he was appointed manager of the branch in Nuremburg, a position which he held until he retired on pension in 1917.

Will.—The late Major J. F. HALL-EDWARDS, a pioneer in X-ray work, left £5,111.

New Companies Registered.

Premier Electric Co. (Stockport), Ltd. (216,781).—Private company. Registered October 12th. Capital, £100 in £1 shares. Objects:—To carry on the business of electricians, wireless engineers and factors, electrical and mechanical engineers, &c. The permanent directors are:—E. C. Aspden, 92, Grenville Street, Stockport; J. Kay, 120-122, Castle Street, Edgeley, Stockport; A. Dutton, 78, Castle Street, Edgeley, Stockport; G. Trafford, 5, Lord's Avenue, Weaste, Salford; W. S. Whittaker, 5, Cranbrook Drive, Sedgley Park, Prestwich; W. Mellor, 65, Union Street, Stockport; W. J. Davies, 142, Cheadle Old Road, Stockport. Qualification, £1. Remuneration as fixed by the company. Solicitor: J. G. Bishop, 47, Mosley Street, Manchester. Registered office: 135, Castle Street, Edgeley, Stockport.

Philip Henry & Co., Ltd. (216,651).—Private company. Registered October 6th. Capital, £100 in £1 shares. Objects: To acquire the business of a manufacturer, factor and retailer of electrical and wireless supplies, carried on by V. A. Walker, at 20, Stafford Street, Birmingham. The first directors are:—V. A. Walker, 17, Woodstock Road, Moseley, Birmingham, wireless manufacturer and dealer (managing director); Mrs. Florence A. Harris, 15, Woodstock Road, Moseley, Birmingham; Mrs. Ethel D. Walker, 15, Woodstock Road, Moseley, Birmingham. Remuneration of managing director: £208 per annum. Registered office: 20, Stafford Street, Birmingham.

Erith Electrical Company (Barber & White), Ltd. (216,717).—Private company. Registered October 9th. Capital, £400 in £1 shares. Objects: To acquire the business of electrical engineers and makers of and dealers in wireless apparatus, carried on by W. J. Barber and W. White, at 88, High Street, Erith, Kent. The directors are: W. J. Barber, 5, Barnehurst Avenue, Erith, Kent, electrical engineer; W. White, 50, Barnehurst Close, Erith, Kent, mechanical engineer. Solicitor: Geo. D. Parker, 91, Cannon Street, E.C.4. Registered office: 88, High Street, Erith, Kent.

Wellington District Electricity Co., Ltd. (216,730).—Registered as a public company on October 9th, with a nominal capital of £5,000 in £1 shares. The objects are to carry on in the U.K. or elsewhere the business of an electric light and power company in all its branches. Minimum cash subscription: 500 shares. The first directors are: J. G. B. Stone, Muir House, Broadwater, Worthing, director of public company; K. A. Scott Moncrieff, M.I.E.E., The Clough, Oxted, engineer; Sir Home Gordon, Bt., 2, Ryder Street, S.W.1; Lt.-Col. G. C. Stowell, Glendale, Church Road, Hanwell, secretary to public company; J. Eustace, M.I.E.E., Elmhurst, London Road, Chelmsford, engineer. Qualification: £100. Remuneration as fixed by the company. Solicitors: Wilkinson, Bowen, Jackson and Curran, 34, Nicholas Lane, E.C. The registered office is at 424, Salisbury House, London Wall, E.C.2.

Passinghams (Bradford), Ltd. (216,800).—Private company. Registered October 13th. Capital, £3,000 in £1 shares. Objects:—To carry on the business of manufacturers of and dealers in wireless machines and all accessories thereto, office furniture, &c. The first directors are:—M. W. Passingham, 19, Leeds Road, Bradford; A. R. Passingham, North Hill, Myddleton, Ilkley. Qualification, £1. Secretary: A. R. Passingham. Solicitors: A. V. Hammond & Co., Bradford.

British Telegraphones, Ltd. (216,837).—Private company. Registered October 15th. Capital, £100 in £1 shares. Objects: To acquire any invention relating to telegraphy and telephony by wire, wireless, or otherwise, time, voice and sound recording machines, and the production, treatment, storage, application, distribution and use of electricity, and any apparatus therefor, &c. The subscribers (each with one share) are:—G. E. Garrett, The Cottage, Betchworth, clerk; N. E. Perkins, 42, Guilford Street, W.C.1, solicitor. The first directors are to be appointed by the subscribers. Solicitors: Kenneth Brown, Baker, Baker, Lennox House, Norfolk Street, W.C.2.

Rheostors, Ltd. (216,858).—Private company. Registered October 15th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers and assemblers of and dealers in microstat filament resistances and all kinds of wireless and electrical apparatus and component parts, &c. The subscribers (each with one share) are:—H. A. Yoward, 136, Bristol Road, Birmingham, wireless goods manufacturer; C. A. Hardy, 21, Haden Hill, Wolverhampton, cashier. H. A. Yoward is permanent governing director. Qualification, 1 share. Remuneration as fixed by the company. Solicitor: G. H. Willcox, 47, Temple Row, Birmingham. Registered office: 7, Waterloo Street, Birmingham.

M. P. O'Brien Electric Light Co., Ltd. (7,539).—Private company. Registered in Dublin September 29th. Capital, £100 in £1 shares. Objects:—To carry on the business of an electric light and power company. The subscribers (each with one share) are:—E. J. P. O'Brien, Edenderry, merchant; Mrs. A. M. O'Brien, Edenderry. E. J. P. O'Brien is first governing director.

Official Returns of Electrical Companies.

A. E. Tribe & Co., Ltd.—A. E. Tribe, of 18, London Street, Basingstoke, was appointed receiver on September 28th, 1926, under powers contained in debentures dated September 21st, 1926.

Electrolite, Ltd.—S. R. Worley, of 23, Bush Lane, E.C.4, ceased to act as receiver or manager on October 4th, 1926.

North Somerset Electric Supply Co., Ltd.—Mortgage debenture dated September 27th, 1926, to secure £30,000, charged on the freehold and leasehold hereditaments and premises comprised in debentures dated October 30th, 1922, and February 23rd, 1925, and all the property, assets and undertaking charged thereby. Holder: H.M. Treasury Solicitor. (The present debenture ranks *pari passu* with the original debentures.)

British B.A.G., Ltd. (200,226).—Capital, £12,000 in £1 shares. Return dated May 10th, 1926. All shares taken up. £5,400 paid (being £1 per share on 3,000 shares and 8s. per share on 6,000 shares). £3,000 considered as paid on 3,000 shares. Mortages and charges, nil.

Fitt Bros. & Davies (1924), Ltd. (200,210).—Capital, £6,000 in £1 shares. Return dated June 10th, 1926. 3,266 shares taken up. £3,266 paid. Mortgages and charges, nil.

Wantage Electric Supply Co., Ltd. (198,584).—Capital, £6,000 in 600 cumulative preference shares of £5 each and 3,000 ordinary shares of £1 each. Return dated August 28th, 1926. 240 preference and 2,202 ordinary shares taken up. £3,402 paid. Mortgages and charges, nil.

Clifford Covering Co., Ltd.—Second mortgage debenture dated September 29th, 1926, to secure £2,500 charged on the company's undertaking and property, present and future, including uncalled capital (subject to such of the £3,500 first mortgage debentures as shall for the time being be outstanding). Holder: H. Joyce, 11, Augustus Road, Edgbaston, Birmingham.

International Electric Co., Ltd. (113,906).—Capital, £51,000 in 31,000 ordinary and 20,000 preference shares of £1 each. Return dated August 27th, 1926. 30,100 ordinary and 5,822 preference shares taken up. £32,922 paid on 27,100 ordinary and 5,822 preference shares. £3,000 considered as paid on 3,000 ordinary shares. Mortgages and charges, £70,500.

Birmingham District Power and Traction Co., Ltd. (19,077).—Capital, £700,000 in 250,000 preference and 450,000 ordinary shares of £1 each. Return dated June 2nd, 1926. 146,846 preference and 412,934 ordinary shares taken up. £559,780 paid. Mortgages and charges, £286,299 4½ per cent. debenture stock.

Hexham and District Electric Supply Co., Ltd. (83,869).—Capital, £35,000 in 7,605 "A," 6,479 "B," and 20,916 "C" shares of £1 each. Return dated May 12th, 1926. 7,605 "A," 6,479 "B," and 17,438 "C" shares taken up. £25,043 paid. £6,479 considered as paid. Mortgages and charges, £26,000.

Siemens Bros. & Co., Ltd. (14,777c).—Capital, £3,000,000 in 2,000,000 ordinary and 1,000,000 10 per cent. cumulative preference shares of £1 each. Return dated June 14th, 1926. 2,000,000 ordinary and 550,000 preference shares taken up. £2,455,349 paid. £169,651 calls unpaid. Mortgages and charges, £820,100.

Edward Dewhurst, Ltd. (177,199).—Capital, £20,000 in £1 shares. Return dated September 6th, 1926. 15,672 shares taken up. £1,502 paid. £14,170 considered as paid. Mortgages and charges, nil.

George H. Neal & Co., Ltd.—F. Wilcock, of 1, Great Winchester Street, E.C.2, ceased to act as receiver or manager on September 30th, 1926.

Leatherhead and District Electricity Co., Ltd.—Issues on June 9th of £200, on July 29th of £200, and on September 30th, 1926, of £200 debentures, parts of a series already registered.

City Notes.

Reports and Meetings of Electrical Companies, Dividend Results, &c.

Kensington and Knightsbridge Electric Lighting Co., Ltd.

An extraordinary general meeting was held on October 11th, for the purpose of considering a series of resolutions for altering the capital of the company consequent upon the recent London Electricity Act. The resolutions provided, *inter alia*, for dividing each of the existing £5 ordinary shares of the company into five shares of £1 each, and increasing the capital to £500,000 by the creation of 150,000 additional ordinary shares of £1 each. Mr. F. J. Walker, who presided in the absence of Col. Crompton, the chairman, moved the resolutions. He said that, as indicated in the last report, the electricity supply industry, so far as London was concerned, had been largely reorganised by the London Electricity Acts passed last year, in pursuance of which, in exchange for an extension of tenure till the year 1971, the companies were transferring their generating stations to a new company called the London Power Company, Ltd., while retaining their distributing rights, and were submitting to the regulation of both dividends and prices. So far as the preference shareholders were concerned, their position was in no way affected by the Act. With regard to the ordinary shareholders, the company was permitted, subject to sufficient profits being available, to pay them for each year from 1926 to 1931 inclusive, a standard dividend equal to the total of (*a*) 10 per cent. on the amount of ordinary share capital subscribed in cash as at December 31st, 1922, and (*b*) 7 per cent. on any free reserves capitalised. As from January 1st, 1932, the percentage on ordinary capital subscribed in cash before December 31st, 1922, would be reduced from 10 per cent. to 7 per cent. Under that arrangement it was obviously to the advantage of the ordinary shareholders that the free reserves should be capitalised, and it was the intention of the board to capitalise a sum of £189,000 and distribute it among the ordinary shareholders by issuing nine new fully paid ordinary shares of £1 each for every £5 ordinary share now held. On the basis of that proposed capitalisation of reserves the ordinary share capital would be increased to £294,000, and the standard dividend thereon from 1926 to 1931 inclusive would be £23,730, which was equal to a little over 8 per cent. on the increased capital. After 1931 the standard dividend would be £20,580—exactly 7 per cent. An interim dividend of 5 per cent., amounting to £5,250, had already been paid for 1926. Deducting that amount from the standard dividend there was left a balance of £18,480, or approximately 6¼ per cent. on the increased capital. The Act further provided that in the event of their being able to reduce their charges to consumers for electricity supplied below the standard prices, one-sixth of such difference, if profits were available, might be used wholly or partly for the purposes of additional dividends for the ordinary shareholders or for the accumulation of reserves. Their company was now a constituent of the London Power Company, which had been formed with the sole object, through the amalgamation of control of the generating stations, of cheapening the cost of electricity. All the electricity required for their consumers would, in future, be purchased by them from that company. The standard price had not yet been fixed, but the company had already made a substantial reduction in prices to consumers commencing last March. Further, it had made no advance in the tariff to meet the exceptional costs of fuel which had arisen through the coal dispute. Referring to the Electricity Supply Bill, Mr. Walker said that the principle was an old one, for the London companies sought similar powers so long ago as 1908, and if the schemes were worked out on sound commercial lines, good might result. The Acts and Orders of last year provided for the constitution of a joint electricity authority for London, which had now been established, and for the companies' taking steps to centralise the generation of electricity for supply in their own districts and elsewhere. Steps had been taken by the companies associated with the London Power Company to carry out the duties Parliament had imposed on them and concentration of the existing resources of the constituent companies was proceeding rapidly. Mr. C. P. Sparks seconded the resolutions, which were carried unanimously.

Perak River Hydro-Electric Power Co.

The statutory meeting of the company was held on October 12th. The Master of Elibank (the Hon. Gideon Murray, chairman) presided, and announced that arrangements had been made for the issue in the near future of £1,250,000 of 5 per cent. debenture stock, the principal and interest of which would be guaranteed on certain conditions by the Government under the provisions of the Trade Facilities Acts. It was not to be expected that the construction of the permanent works had as yet been commenced, but good progress was being made with plans and designs, and, since the incorporation of the company, the board had received reports from the consulting engineer confirming the already-expressed view that the site of the dam would be on solid granite.

German Companies.

Although the *Robert Bosch Co.*, Stuttgart, has declared a dividend of 8 per cent. for the last financial year, it has been decided that it shall not be paid until 1931, this action having been decided upon in order to strengthen the financial position of the concern during the difficult period through which Germany is passing. The company has a capital of £1,500,000, but it is pointed out that the whole of the shares are held by Herr Bosch and the other directors of the concern, in conjunction with relatives.

The *Bank of Electrical Values*, Berlin, reports profits from dividends and interest amounting to 1,829,000 marks for 1925-26; it is paying a dividend of 9 per cent., as compared with 5 per cent. in the previous year, when the net profits were 850,000 marks.

The *Hamburg Electricity Industry Company*, which belongs to the Siemens concern, reports net profits of 65,000 marks for 1925-26, and a dividend of 5 per cent. is being paid, these figures comparing with 92,000 marks and 8 per cent. in the preceding year.

The *Rheydt Cable Works Company*, reporting on the year ended June 30th, 1926, states that the results for the past year were satisfactory. After making provision for depreciation, the accounts show net profits and balance forward amounting to 1,011,000 marks, as against 1,058,000 marks in the previous year, the rate of dividend being 12 per cent., as compared with 15 per cent. in 1924-25.

Swiss Companies.

The report of the *Société des Ateliers de Constructions Mécaniques Escher Wyss and Co.*, Zurich, for the last financial year, 1925-26, shows a loss of 223,740 fr., due, it is stated, to exchange fluctuations in Italy, France, and Belgium. In 1924-25 there was a net profit of 635,895 fr., and a dividend of 8 per cent. was paid on the preference shares.

The *Electro-Values Company*, Basle, recommends the payment of a dividend of 7 per cent. for 1925-26 on the share capital of 20,000,000 fr., this being the same as in the previous year.

The *Bank for Electrical Undertakings*, Zurich, reporting on the year 1925-26, states that, despite the unfavourable conditions, the undertakings in which the bank is interested were not badly affected. New connections compensated for a large part of the diminution of receipts from old customers. The directors regard the future as promising for the undertakings on a revival of economic conditions. As mentioned in a previous issue, the rate of dividend is 9 per cent. out of net profits of 5,630,000 fr., as compared with 8 per cent. and 5,033,000 fr. in the previous year.

Burndept Wireless, Ltd.—The company has addressed a circular to the preferred ordinary shareholders pointing out that the response received from this particular class of shareholder to the debenture issue has been "so negligible as to leave the impression that the shareholders do not understand the gravity of the situation." It is pointed out that every preferred ordinary shareholder is entitled to 100 deferred ordinary shares, free of expense, for every £100 debenture subscribed for and allotted. Unless the preferred ordinary shareholders between them, the circular adds, subscribe for at least £10,000 debentures the issue cannot go to allotment and liquidation must face the company.

Stock Exchange Notices.—Application has been made to the Committee to allow the following to be officially quoted:

Lancashire United Transport and Power Co.—£250,000 6 per cent. first mortgage debenture stock.

Montreal Light, Heat and Power Consolidated.—1,941,837 common shares of no nominal or par value.

Dealings in the following have been specially allowed by the Committee under Rule 159:—

Midland Counties Electric Supply Co., Ltd.—250,000 new ordinary shares of £1 each partly paid and fully paid, Nos. 1,250,001 to 1,500,000. 250,000 new 6 per cent. cumulative preference shares of £1 each partly paid and fully paid, Nos. 1,250,001 to 1,500,000.

Montreal Light, Heat and Power Consolidated.—1,941,837 common shares of no par value (Interim certificates.)

Underground Electric Railways Co. of London, Ltd.—5,068,878 ordinary shares of £1 each fully paid, Nos. 1 to 5,068,878.

Companies to be Struck off the Register.—The names of the undermentioned companies will be struck off the Register at the expiration of three months unless cause is shown to the contrary:—

Bennetts (Electrical Engineers), Ltd.
Bloom's (Wireless), Ltd.
City of Wells and District Electricity Supply Co., Ltd.

Argentine Light and Power Co., Ltd.—The credit balance for the past year was £136,521. To this is added £15,133 brought forward, making £151,654. After providing £12,777 for debenture stock redemption, and £7,500 for share capital redemption, transferring £35 000 to general reserve, and paying the preference dividend, it is proposed to pay a dividend of 4 per cent. on the ordinary shares, as against 2½ per cent. in 1924-25, leaving £14,258 to be carried forward.

Montevideo Telephone Co., Ltd.—The net profit for the year ended July 31st last was £37,886. The interim dividend absorbed £6 5!4, and to the balance is added £14,583 brought forward, making £45,955. It is proposed to transfer £20,000 to reserve and to pay a final dividend of 5 per cent., free of tax (making 8 per cent. for the year), leaving £15,099 to be carried forward. Meeting: October 26th.

St. James' and Pall Mall Electric Light Co., Ltd.—This company announced last week that, under the London Electricity (No. 2) Act it intends to capitalise £440,000 of the reserves and to distribute this in the ratio of 11 to 5 to the ordinary shareholders. The arrangement necessitates the division of the existing £5 shares into five shares of £1 denomination.

Electrolytic Zinc Co. of Australasia.—It is reported that the profit for the past year was £420,699, after transferring £145,000 to depreciation reserve and providing for taxation. The addition of £165,932 brought forward makes available £586,631. After various allocations, dividends Nos. 8 and 9 have been paid, and £182,686 is being carried forward. Since the close of the year dividend No. 10 had been paid.

New Issue.—*Midland Counties Electric Supply Co., Ltd.*—The lists for the issue of the balance of the authorised capital, mentioned in our last issue, were closed for London on the day of publication of the prospectus, October 13th.

United Electric Tramways Co. of Caracas, Ltd.—The report for the year ended June 30th last shows a net profit of £27,511, to which is added £22,796 brought forward, making £50,307. It is proposed to pay a dividend of 10 per cent. (as in 1925) and to carry forward £33,308.

Joseph Lucas, Ltd.—A dividend of 10 per cent. is recommended on the ordinary shares (making 15 per cent. for the year), together with a bonus of 2s. per share.

Indo-European Telegraph Co., Ltd.—An interim dividend at the rate of 5 per cent., free of tax, is announced. A similar distribution was made last year.

Hoffman Manufacturing Co., Ltd.—An interim dividend of 4 per cent., free of tax, has been declared on the ordinary shares, as in 1925.

Brazilian Traction, Light and Power Co.—A quarterly dividend of 1¼ per cent. has been declared on the ordinary capital stock.

Stocks and Shares.

MONDAY EVENING.

THE excitement in London electricity supply shares has died down a good deal since we were last writing, when the Kensington and Knightsbridge announcement was made of the proposed capitalisation of reserves. The company's announcement came as such a pleasant surprise that all the shares in the London list responded sharply. The St. James' and Pall Mall has followed with still more satisfactory intention, it being proposed to capitalise reserves and to distribute £11 per £5 share to the fortunate proprietors of the ordinary capital. It may be that people expect these two to prove the best of the list, and to anticipate that nothing more satisfactory can possibly be looked for. The rises that occurred have had, therefore, the effect of bringing in a good many sellers. Prices have been tolerably well maintained; there has been little reaction in the nominal quotations, and in some cases a free market continues to prevail.

On the whole, however, the disposition has been, and still is, for people to take their profits on the rise, and, where they have not sold the whole of their shares, to let go a certain amount with the idea of putting themselves on velvet in regard to the balance. The buyers who rushed into the market at the first blush of enthusiasm caused by the Kensington and Knightsbridge announcement have wondered, perhaps, a little at their temerity, but are resolved to see the thing through, particularly in view of the fact that when the market settles down, this should be at prices that command a higher level than rules to-day. As is generally known, the standard of dividend falls all round to 7 per cent. after 1931, and it is equally well known that investment fights somewhat shy of buying Stock Exchange securities in which the nominal interest automatically declines after a period.

City of London shares are better at 50s. 9d., and St. James' rose 10s. on the suggested capitalisation of reserves. Bournemouth and Poole are good at 60s. 9d., after changing hands at 62s., the strength of the market in this case being due to the anticipation of the company's acquisition by local authorities. Westminsters weakened to 48s. 9d., Metropolitans to 40s. 9d. County of London retain their big rise at 3¼. London Electric shares are a little harder at 35s. 6d. The preference group is steady, and, apart from Bournemouth and Poole, prices of the provincial issues remain as they were a week ago. The Electricity Bill will probably pass in the forthcoming session of Parliament.

In view of the difficulty that there is in obtaining coal and domestic servants, particular interest attaches to the report issued by the Advisory Committee of the Electricity Commissioners with reference to the extension of electrical appliances in the ordinary house. The gas companies have scored heavily in the matter of supplying gas-stoves. Electricity supply and manufacturing companies can hardly fail to benefit by an increase in the demand for heating apparatus. The lay consumer might venture, with diffidence and trepidation, to suggest that greater efficiency in humdrum domestic utilities, hot-plates, radiators, and the like, would popularise their use more effectively than a dozen reports from Advisory Committees.

Cable stocks and shares show strength, and various dividend deductions, made from prices last week, are in course of being recovered. Cuba Submarines have risen 2s. 6d.; the interim dividend of 5 per cent., tax free, is the same as that of last year. The Montevideo Telephone Company's final dividend is 5 per cent., tax free, making 8 per cent. for the year, against 7 per cent., less tax, in the previous twelvemonth. Lively dealings in Automatic Telephones and Internationals, on dividend hopes, resulted in rises to 56s. 3d. and 49s. 6d., respectively. The Telephone Manufacturing shares, fully-paid and partly, have firmed up to a premium of about 3d. per share. The Marconi market is dull and heavy. Marconis slipped back to 12s. 6d., Canadians to 3s. 3d.

Telegraph Constructions gained their accustomed 10s., this bringing up the price to 30½. Johnson & Phillips shed ½; smaller falls occurred in Brush, Callenders and Cromptons. Iron and steel shares remain lumpish, but Babcocks are a good market at 53s. 9d., ex-dividend.

Brazilian Tractions have been moving in a nerve-racking fashion—to those who are interested in the fluctuations. The price dropped to 108, rallied to 113, and then gave way to 105 on heavy sales. This leaves a net loss of 7 points on the week. The preferred are lower at 106. Various explanations are offered in the market to account for these extraordinary ups-and-downs, but none can be deemed even passably satisfactory. The true reason has yet to emerge. Dollar stocks, as a whole, are weaker. Pennsylvania Water shares drooped to 165¼.

Dealings have started in the new shares of the Underground Electric Railways of London, the price starting at 11s. 3d. middle. The £10 shares rose to 4 1/16th, but parted with the fraction later. Districts gained 1½ points with a rise to 54. The new Morden extension is proving extremely popular, and obviously supplies what the advertisements call a long-felt want. London and Suburban Traction preference are 6d. higher at 5s. 6d. Several of the foreign tramway issues are harder; amongst them, Anglo-Argentine Tramways second preference at 2 13/16ths and Mexico Tramways Fives at 67½. The rubber share market keeps firm on the impression that the standard production will be lowered to 80 per cent. on November 1st for the following quarter.

Share List of Electrical Companies.

	Nom.	Dividend. 1924.	Dividend. 1925.	Price Oct. 18 1926.	Rise or fall.	Yield p.c.
Home Electricity Companies.						
Bournemouth and Poole	£1	14	14	3 1/16	+1/-	4 12 1
Brompton Ordinary	1	10	10	1 7/8	—	5 12 2
Charing Cross Ordinary	1	15	15	2 7/16	—	6 8 1
do. do. 4½ Pref.	1	4½	4½	17/6	—	5 2 10
Chelsea	1	12	12	2½	—	5 12 11
City of London	1	15	15	50/9	+7/16	5 18 6
do. do. 6% Pref.	1	6	6	23/-	—	5 4 4
Clyde Valley	1	8	8	27/-	—	5 18 6
County of London	1	15	15	3½	—	4 18 4
do. do. 6% Pref.	1	6	6	23/-	—	5 4 4
Edmundson's Ordinary	1	7	8	1¾	—	5 16 5
do. 7% Pref.	1	6	7	23/-	+6d.	6 1 9
Elec. Supply Corporation	1	10	10	31/3	—	6 8 0
Kensington Ordinary	5	15	15	17	—	4 8 3
Lancs. Light and Power	1	7½	7½	24/-	—	6 5 0
London Electric	1	10	10	35/6	+6d	5 14 3
do. do. 6% Pref.	5	6	6	54	—	5 11 7
Metropolitan	1	11	11	40/9	+1/16	5 7 10
do. 4½% Pref.	1	4½	4½	17/6	—	5 2 10
Midland Counties	1	5½	6	20/6	—	5 17 1
Newcastle-on-Tyne Ordinary	1	7	7	21/3	—	6 11 9
do. 5% Pref.	1	5	5	17/6	—	5 14 3
do. 7% Pref.	1	7	7	24/-	—	5 16 8
Notting Hill 6% Pref.	10	6	6	10	—	6 0 0
North Met. Elec. 6% Pref.	1	6	6	22/6	—	5 6 8
St. James' and Pall Mall	5	17½	17½	18½	+½	4 14 7
South London	1	15	15	2 11/16	—	5 6 8
South Metropolitan Pref.	1	7	7	1¼	—	5 12 0
Urban Ordinary	1	4	7	1¼	—	5 12 0
do. 6% Pref.	1	6	6	21/-	—	5 14 3
Westminster Ordinary	1	15	15	2 1/16	—1/16	6 3 0
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	20/6	—	7 6 4
Yorkshire Elec.	1	8	8	27/-	—	5 18 6
Home Rails.						
Central London Ord. Assented	Stock	4	4	69	—	5 15 11
Metropolitan	,,	5	5	61	—1	8 4 6
do. District	,,	3½	3½	54	+2½	6 9 8
Underground Electric Ordinary	10	Nil	Nil	4	—	Nil
do. do. "A"	1/-	Nil	Nil	12/-	—	Nil
do. do. Income	Bonds	6	6	101	—	*5 18 10
Telegraphs and Telephones.						
Anglo-Am. Tel. Pref.	Stock	6	6	103xd	—	5 16 6
do. Def.	,,	1½	1½	24½	—	6 1 3
Automatic Telephone	1	3	10	2½	+1/16	3 11 1
Chili Telephone	5	5	6	6¾	—	4 7 4
Cuba Sub. Ord.	10	5	5	7¼xd	+¼	7 0 4
Eastern Extension	10	10	10	19xd	+¼	*5 5 3
Eastern Tel. Ord.	Stock	10	10	189½xd	+1	*5 5 10
Globe Tel. and T. Ord.	10	10	10	19½	—½	*5 5 3
do. do. Pref.	10	6	6	11½	—	5 7 10
Great Northern Tel.	10	22	20	27½	—½	7 7 1
Indo-European	25	8½	10	47½	—½	*5 5 10
Marconi	1	10	Nil	13/9	—	... ...
Marconi-Marine	1	10	7½	21/3	+1/16	7 1 2
Oriental Telephone Ord.	1	12	12	46/3 xd	+9d	*5 3 10
United R. Plate Tel.	5	8	8	8⅝	—	*4 15 7
Western Telegraph	10	10	10	18½	—	*5 8 1
Home and Foreign Trams, &c.						
Anglo-Arg. Trams First Pref.	5	5½	5½	3	—	9 3 4
do. do. 2nd Pref.	5	6	6	2 11/16	+1/16	10 13 4
do. do. 5% Deb.	Stock	5	5	75	—	6 13 4
British Electric Traction Ord.	,,	7	8	140	—	5 14 4
do. do. 6% Pref.	,,	6	6	110	—	5 9 1
Brazil Traction	100	4	5	105	—7	4 15 0
Brit. Columbia Elec. Rly. Pref.	Stock	5	5	86½	—	5 15 7
do. do. Preferred	,,	96/-	126/9	113½	—	*5 12 0
do. do. Deferred	,,	129/5	8	143	+1	*5 12 0
do. do. Deb.	,,	4¼	4¼	77½	—	5 7 7
London & Sub. Trac. 5% Pref.	1	2½	Nil	⅞-	+6d	Nil
London United Tram. Deb.	Stock	4	4	43½	—1	9 6 0
Mexico Trams. 5% Bonds	—	5	5	67½	+2	7 8 2
Mexican Light Common	100	Nil	Nil	35½	+1½	Nil
do. Pref.	100	Nil	Nil	85½	—	Nil
do. 1st Bonds	—	5	5	70	—	7 2 10
Yorkshire (West Riding)	1	5	—	11/6	—	... ...
Manufacturing Companies.						
Babcock & Wilcox	1	12	13	2½ xd	+1/-	4 16 9
British Aluminium Ord.	1	5	10	46/3xd	—	4 6 8
British Elec. Transformer Pref.	1	Nil	7	18/3	—	7 13 5
British Insulated Ord.	1	15	15	3½	—	4 5 9
Brush Ord.	1	10	10	26/-	—1/-	7 13 10
Callenders	1	15	15	3 1/16	—1/16	4 10 9
do. 6½% Pref.	1	6½	6½	23/9	—	5 9 5
Crompton Ord.	1	Nil	Nil	12/-	—1/3	... ...
Edison-Swan	4/-	10	10	12/9	—	3 2 7
do. 5% Deb.	Stock	5	5	80	—	5 16 3
Electric Construction	1	10	10	32/-	+3d	6 5 0
Enfield Cable Pref.	1	7½	7½	1¼	—	6 6 4
English Electric	1	5	Nil	14/6	—	... ...
do. do. Pref.	1	6	6	17/6	—	6 17 2
Gen. Elec. Pref.	1	6½	6½	24/-	—	5 18 1
do. Ord.	1	5	7½	30/3	—	4 19 2
Henley	1	16	20	4¼	—	4 16 10
do. 4½% Pref.	5	4½	4½	4¼	—	5 6 0
India-Rubber	1	5	5	1 1/16	—	*4 14 1
Johnson & Phillips	1	10	17½	68/9	—¼	5 9 9
Met.-Vickers Ord.	1	8	8	25/9	—	6 4 9
do. Pref.	2	8	8	2¾	—	6 14 9
Siemens Ord.	1	7½	7½	1¼	—	5 0 0
Telegraph Construction	12	20	10	30½	+½	*3 18 9

*Dividends paid free of Income Tax.

Market Quotations for Chemicals and Metals.

It should be remembered, in making use of the figures appearing in the following list, that in some cases the prices are only general and they may vary according to quantities and other circumstances.

CHEMICALS, &c.	Price Oct. 18th.	Fortnight's inc. or dec.
a Acid, Oxalic per lb.	5¾d.	...
a Ammoniac, Sal per ton.	£60	...
a Ammonia, Muriate (large crystal) ,,	£52	...
a Bisulphide of Carbon ,,	...	...
a Borax ,,	£25	...
a Copper Sulphate ,,	£25 10s.	...
a Potash, Chlorate per lb.	4d. to 4¼d.	...
a ,, Perchlorate ,,	5½d.	...
a Shellac per cwt.	£15 15s.	...
a Sulphur, Commercial ,,	£9 10s.	...
a ,, Roll ,,	£9 10s.	...
a Soda, Chlorate per lb.	3¼d. to 3½d.	...
a ,, Crystals per ton.	£5 to £5 5s.	...
a Sodium Bichromate, casks per lb.	4d.	...
METALS, &c.		
b Aluminium, Ingots per ton.	£120 to £125	...
b ,, Wire per lb.	1/9 to 2/6*	...
b ,, Sheet ,,	1/6 to 2/-	...
p Babbitt's Metal and Anti-friction Metal—		
Grade I per ton net.	£281	£3 inc.
Grade II ,, ,,	£196	£2 inc.
Grade III ,, ,,	£102	£1 inc.
c Brass (rolled metal 2" to 12" basis) per lb.	9¼d.	...
c ,, Tubes (solid drawn) ,,	1/0 to 1/0½d.	...
c ,, Wire, basis ,,	10½d.	...
c Copper Tubes (solid drawn) ,,	1/1	...
c ,, Bars (best selected) per ton.	£92	£2 inc.
c ,, Sheet ,,	£92	£2 inc.
c ,, Rod ,,	£92	£2 inc.
d ,, (Electrolytic) Bars ,,	£67	5/- inc.
d ,, ,, Sheets ,,	£14 10s.	...
d ,, ,, Wire Rods ,,	£76 15s.	...
d ,, ,, H.C. Wire per lb.	9¾d.	...
f Ebonite Rod ,,	2/3 to 2/6	...
f ,, Sheet ,,	2/3 to 2/6	...
m German Silver Wire ,,	2/2	...
h Gutta-percha, fine ,,	8/-	...
h India-rubber, Para fine ,,	1/8½	½d. dec.
i Iron Pig (Cleveland No. 3.) per ton.	72/6	...
i ,, Wire, galv. No. 8, P.O. qual. ,,	£21	...
g Lead, English pig ,,	£32 10s.	...
g Mercury per bot.	£16 10s.	12/6 inc.
e Mica (in original cases) small per lb.	3d. to 3/-	...
e ,, ,, medium ,,	4/- to 8/-	...
e ,, ,, large ,,	10/ to 20/- & up.	...
p Phosphor Bronze, plain castings ,,	1/3½	...
p ,, ,, drawn bars & rods ,,	1/3	...
p ,, ,, rolled strip & sheet ,,	1/2½	...
p ,, ,, wire ,,	1/4	...
o Platinum per oz.	£23 10s.	...
d Silicium Bronze Wire per lb.	11d.	...
r Steel, Magnet, in bars ,,	7½d.	...
n Tin, Block (English) per ton.	£313 to £313 10s.	£2 to £2 15s. dec.
n ,, Wire, Nos. 1 to 16 per lb.	4/5	...

*For 1 cwt. lots. Special quotations against definite specifications.

Quotations supplied by

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
j Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co., Ltd
p C. Clifford & Son, Ltd,
r W. F. Dennis & Co.

Flexible Wire Testing.—The Association Suisse des Electriciens some time ago appointed a special committee to draw up new rules regarding insulated conductors for internal house wiring installations. This Committee, among other things, has recommended that flexibles used in connection with counterweight pendants, which are liable to repeated flexions should in future not be subjected to torsion tests but to a flexibility test at ordinary temperature in which a 9 ft. length of flex shall be pulled 3,000 times in both directions over a system of two pulleys of 35 mm. diameter and fixed 100 mm. apart vertically and 45 mm. horizontally. To one end of the flex a 2.2-lb. weight is to be attached, while the other end is to be connected to a lever connected with a winding mechanism revolving at 10 r.p.m., and so arranged that at each revolution the weight is lifted and then returned to its bottom position. In this way the flex will be given a to and fro motion over the pulleys at a maximum speed of about 100 ft. per min. The flex is only to be regarded as satisfactory if it passes through the test without the insulating covering being in any way damaged or any of the strands broken. This test is to be followed by one for dielectric rigidity, in order to make certain that the core of the flex remains intact. In this case the sample of the conductor is placed in water at a maximum temperature of 25 deg. C. for 24 hours, at the end of which time the water is still to be clear. The pressure test is to be effected under water by means of a.c. as sinusoidal as possible, the voltage being gradually raised from 250 to 4,000; the latter pressure is to be maintained for ten minutes with one conductor connected to the source of supply and the other earthed, this being repeated with the conductors changed over, and finally between both conductors and earth. The object of immersing the flex in water is to enable the liquid to enter all the pores of the insulating covering, which is regarded as the weak point of household installations.

Correspondence.

Correspondents should forward their communications **at the earliest possible moment.** *No letter can be published unless we have the writer's name and address in our possession.*

Pivot Friction.

I have read with great interest the article in the current issue of the Electrical Review on "Pivot Friction," by Mr. F. L. Best.

I know from experience the importance of obtaining a superfine polish on pivots when a minimum of friction is necessary. The question of toughness also comes in when the load on the pivots is great. The best steel to use is, I believe, a eutectoid crucible steel. This steel is, however, especially sensitive to comparatively small errors of heat-treatment. It can be treated in an electric furnace fitted with a pyrometer, if very special precautions are taken to ensure that the pyrometer does really and truly measure the temperature of the steel, and if very great care is taken to maintain a uniform furnace temperature with a regular time schedule.

However careful one may be, the difficulties of operation are so great that it is not possible to obtain ideal results every time, and what is perhaps even more disturbing, the operator does not know how far he is falling off from his ideal. The safest and most certain way of carrying out the heating operation is to fit to the furnace the necessary apparatus for showing the exact moment when the steel passes from the ferro-magnetic to the non-magnetic condition. As soon as the pivots lose their last trace of ferro-magnetism they should be withdrawn from the furnace and quenched in oil. In this manner the finest possible grain is obtained, and it has been shown quite conclusively that the finer the grain, the higher the polish obtainable. The finest grain is also accompanied by the development of the greatest toughness obtainable without the sacrifice of full hardness.

I know of one firm of repute in particular which has adopted this method of hardening pivots, and declares that the improvement in the polish obtained has been most remarkable.

Lancelot W. Wild.

London, *October 15th*, 1926.

Pulverised Coal Firing.

The Electrical Review of September 24th contains a short *résumé* of a report by Mr. Seddon, of the Edinburgh Corporation Electric Supply Department, on his visit to powdered-fuel plants in this country and on the Continent.

In the report in question, Mr. Seddon admits that steam can be raised more efficiently and more economically with pulverised-fuel-fired boilers than with stoker-fired boilers, but he is not satisfied that the plant available for drying and pulverising has reached such an advanced state as to be sufficiently reliable for central-station work.

Pulverised-coal firing on a very large scale has only been introduced into this country within the last three years, and the fact that so many central-station engineers have decided to adopt the system shows that well-informed opinion is very much in its favour.

Mr. Seddon has chosen a rather unfortunate time to visit pulverised-coal-fired stations as, owing to the coal strike, these have been working under conditions which are altogether abnormal. Under the emergency conditions at present obtaining, pulverised-fuel plant is consuming coal containing up to 25 per cent. of moisture and 45 per cent. of ash, a lower grade of coal than was planned for in any plant known to the writer. Even under these adverse conditions, however, the fact remains that where pulverised-fuel-fired boilers and stoker-fired boilers are operating side by side, the former have had to bear the brunt of the strike as far as maintaining the station load is concerned. That pulverised-fuel firing has amply justified itself under these conditions is shown by the fact that in one large electric generating station partially equipped with pulverised-coal firing, an efficiency of 60 per cent. has been maintained with coal having a calorific value of only 4,500 B.th.u./lb. and an ash content of over 35 per cent. The pulverising and drying equipment is dealing with this fuel in a satisfactory manner, with the exception that the output is slightly reduced and the moisture content of the pulverised product not as low as might be desired.

Pulverised-fuel engineers have certainly had to learn a good deal about the drying and pulverising of low-grade fuels, but there is no question that development has now reached a stage where the stoppage of a boiler due to breakdown of the drying and pulverising plant is only a remote possibility. In this connection it may be of interest to state that at Gennevilliers the practice is to keep the pulverised-coal-fired boilers on the line until the blowing of a tube or other such occurrence necessitates their being shut down. At this station the boilers are being continuously operated for three months or more at a time. The facts of the matter are that, with stoker firing, the vulnerable part is the mechanical grate, breakdown of which necessitates the shutting-down of the boiler. With pulverised-coal firing, on the other hand, the vulnerable part is the mill, breakdown of which can be rectified in a few hours. Apart from this, it is the usual practice to install ample stand-by pulverising plant as a safeguard against stoppage of steam production.

The greater dependability of the pulverised-fuel-fired boiler as compared with the stoker-fired boiler is not a matter of opinion, it is a matter of experience.

Mr. Seddon also condemns pulverised coal on the score of dust and noise, and here again the emergency conditions obtaining have given him a wrong impression. With normal grades of coal, pulverising plant is neither noisy nor dirty, but with coals of very high moisture content, such as are being used at present, the capacity of the mills is somewhat reduced, giving rise to a certain amount of pounding and noise, while with 30 per cent. to 35 per cent. of ash some dust and grit trouble is to be expected. If Mr. Seddon had seen the various plants which he visited operating with the coals for which they were designed, he would have formed an entirely different impression.

Taking everything into account, and having regard to the fact that the Portobello power station will probably become a capital station under the proposed scheme of reorganised power production, it would seem to be unfortunate that stoker-fired boilers have been recommended, particularly as there is every possibility that a combination of pulverised-coal firing and low-temperature carbonisation will in the near future provide the best means of producing cheap electrical energy from low-grade fuels and colliery waste. From this point of view the Portobello station is perhaps better placed than any other station in the country, situated as it is in the heart of the London coal field.

E. G. Ritchie.

London, *October 14th*, 1926.

The Remuneration of Electrical Engineers.

Referring to the letter under the above heading in the issue of your journal for October 15th, "Chief Engineer" seems to find it a difficult matter to select a man who could satisfactorily fill a position worth £300-£400 a year.

I would like to draw his attention to the fact that in nine cases out of every ten the posts that are often advertised in connection with electricity supply undertakings are rated much lower than the figures mentioned. So low and ridiculous, in fact, are most of them that any qualified engineer worthy of the name would never dream of applying for them.

The supply undertakings would find no difficulty in obtaining plenty of the £300 to £400 class of applicants if these salaries were offered—men who could step quite easily into the chief's boots, and the company would still carry on as if no change had taken place.

William J. Saunders.

Bexhill-on-Sea, *October 16th*, 1926.

The Lightning-rod Act in Ontario, Canada.

Mr. E. Isherwood, in his communication in the Electrical Review of the 15th inst., concerning lightning discharges on to non-conducting surfaces of the earth, states that he has no knowledge of the production of fulgurites under these circumstances, although the phenomenon was observed at an early date.

Prof. Chas. Darwin, in his expedition in Northern Patagonia in 1832, discovered in the sand hills near Maldonado a group of vitrified siliceous tubes, which he attributed to their being formed by lightning entering loose sand (an excellent example of a non-conducting surface). These tubes were about two inches in circumference and deeply furrowed as if compressed by the surrounding sand during cooling. One specimen which appeared not to have been so compressed had a circumference of four inches. The thickness of the walls of these tubes was from one-tenth to one-twentieth of an inch, and they extended to a considerable depth in the sand.

Another case is recorded by Dr. Priestly in the Geological Transactions in 1790. This occurred at Drigg in Cumberland, where on excavating under a tree which had been struck by lightning, some imperfect siliceous tubes and a melted pebble of quartz were discovered. These tubes extended to a depth of not less than 30 feet. In the above cases the tubes occurred in groups of three or four within a radius of twenty yards, suggesting that the lightning discharge splits up before reaching the earth—which is quite feasible in the presence of a high-resistance layer on the earth's surface.

It would certainly appear from the above that the charge induced by the thunder clouds prior to the discharge exists on the lower conducting strata, and this confirms the necessity for deep earth plates where the upper strata are of a non-conducting nature.

C. H. Brazel.

Swansea, *October 16th*, 1926.

The "Plane-Speaker."—Apparatus has been produced in the United States, and is shortly to be demonstrated in this country, says the *Daily Mail*, which magnifies the human voice to such an extent that words spoken in an aeroplane flying at a considerable height can be heard by people over a wide area below. The mechanism, weighing about half a ton, is installed in the cabin of a large multi-motored 'plane and is operated by two men. It is proposed by the Plane-Speaker Corporation, which is developing the invention, to employ it for giving aerial concerts above cities and public announcements.

Legal.

Claim for Electrical Work.

In the Whitechapel County Court, on October 13th, before Judge Cluer, Clarence N. Lambart, electrical engineer, Poplar, E., sued Morris Abrahams, Hanbury Street, E., to recover £42 for fixing an electric motor, driving pulleys, &c., altering an electric starter, and cable conduit. The defendant filed an affidavit to the effect that the amount claimed was grossly in excess of what it should have been, and paid £20 into Court in full settlement.

Counsel for the plaintiff said that the plaintiff did not actually carry out the work himself, but gave the job to a sub-contractor, and Henry Marston, manager for the sub-contractor, gave evidence, and said the work was carried out under his supervision. Their charges came to £38 6s. 10d., and the plaintiffs had added 10 per cent. for their profit.

Judge Cluer: "Sub-contracting seems to be a very silly way of doing business. The plaintiffs are asking for 10 per cent. of the cost for doing absolutely nothing."

Two witnesses from electrical firms gave evidence for the defendant, that the charges made were excessive, and pointed out that an unnecessarily large cable had been used, which had increased the cost considerably. Two electrical fitters had been employed, together with a boy, but one man and boy would have been sufficient.

Judge Cluer gave judgment for the plaintiff for £28 14s., and costs.

"Underground" Scheme of Arrangement Sanctioned.

In the Chancery Division on October 13th, before Mr. Justice Eve, Mr. Gordon Brown, on behalf of the Underground Electric Railways Co. of London, Ltd., asked for the Court's sanction to the scheme of arrangement outlined in our issue of June 25th last (p. 968).

Mr. Pennell, a holder of "A" shares, opposed the scheme on the ground that it was unfair to the class of shareholder which he represented.

His Lordship said that the scheme had been approved by a majority of all classes and he did not think that he could interfere even if a substantial minority was against the scheme. He therefore gave his sanction.

Tramway Manager Assaulted.

At Darwen, on October 14th, James Tipping, a blacksmith employed in the Corporation tramway depôt, was fined £5, with £3 3s. costs, for assaulting the tramway manager, Mr. G. A. Newsome.

Ackroyd & Best, Ltd.

In the Chancery Division, on October 15th, Mr. Bischoff applied on behalf of this company for an enlargement of the memorandum to the articles of association to enable the company to undertake further manufacturing in the aeroplane and motor-car fields.

Mr. Justice Clauson granted the petition.

Trade-Mark Applications.

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be lodged within one month from October 13th: —

Magnet (design only). No. 471,778. Magnet (lettering only). No. 471,779. Class 1. Chemical substances used in manufactures.—General Electric Co., Ltd.

Snake (lettering only). No. 466,264. Class 6. Electrical machinery and parts thereof. No. 466,265. All goods in Class 8. No. 466,266. Class 13. Electrically-heated culinary utensils and smoothing irons, electric lamps and parts thereof, switches, cut-outs, couplings, sparking plugs, terminals and connections. No. 466,267. Class 14. Nickel and other anodes for electro-plating. Snake (design only). No. 466,269. Class 6. Electrical machinery and parts thereof. No. 466,270. All goods in Class 8. No. 466,271. Class 13. Electrically-heated culinary utensils and smoothing irons, electric lamps and parts thereof, switches, cut-outs, couplings, sparking plugs, terminals and connections, &c. No. 466,272. Class 14. Nickel and other anodes for electro-plating.—Henry Wiggin & Co., Ltd., Birmingham.

W (letter and design). No. 456,278. Class 6. Electric motors, electric self-starters, &c. No. 456,279. Class 8. Rotary switches, h.p. oil switches, triangular star switches, circuit breakers and transformers, single-valve wireless receiving sets, frequency amplifiers, detectors, apparatus, &c. Die Sachsenwerk Licht und Kraft Gesellschaft, Dresden. (British representatives: Mewburn, Ellis & Co., 70-72, Chancery Lane, W.C.2.)

Four White Stripes ((design only). No. 469,836. Class 8. Electric cables having braided covers.—Callender's Cable and Construction Co., Ltd.

Eltron (lettering and design). No. 477,358. Class 8. Electrical immersion heaters, being electrical resistances.—United British, Foreign and Colonial Agencies, Ltd., Sentinel House, Southampton Row, W.C.1.

Donotone. No. 472,387. Class 8. Loud speakers for use in radio-telephony. —W. K. Webster and P. S. O'Donnell, Sentinel House, Southampton Row, W.C.1.

Spade Brand (lettering and design). No. 471,269. Class 13. Switches, contacts and terminals, electric light fittings and accessories, fusible cut-outs, electric bells, junction boxes, sparking plugs, &c.—A. Stokes & Co., Ltd., 56-57, Green Street, Deritend, Birmingham.

Published Specifications.

Compiled expressly for this journal by patent agents. The name of the applicant's patent agent, if any, will be found on the printed specification. The numbers in parentheses are those under which the specification will be printed and abridged and all subsequent proceedings will be taken.

1924.

30,906. "Apparatus for aiding audition." B. E. Eldred. December 23rd, 1924. (258,307.)

1925.

6,240. "Receiving-apparatus for wireless telegraphy and telephony." W. J. S. Clemmey and W. L. Turner. March 7th, 1925. (258,625.)

10,959. "Automatic switching arrangements particularly for use in telephone systems." A. Barnay. April 29th, 1924. (Addition to 223,985.) (233,339.)

13,356. "Wireless and like receiving systems." E. G. Gage. May 21st, 1925. (258,635.)

16,005. "Tungsten wire." Edison Swan Electric Co., Ltd., and G. A. Percival. June 20th, 1925. (258,642.)

16,034. "Electrical sound transmitting devices and systems." W. J. Rickets. June 22nd, 1925. (Cognate application 9,519/26.) (258,643.)

16,198. "Conversion of sound into electrical pulsations." W. J. Rickets. June 23rd, 1925. (258,654.)

16,247. "Wall plugs and sockets for use in connection with electric light and other wiring systems." Sir C. S. Forbes. June 23rd, 1925. (258,658.)

16,295. "Multiple-unit loud speaker." Hopkins Corporation. June 24th, 1924. (236,216.)

16,426. "Spark plugs." M. de Napoli. June 25th, 1925. (258,666.)

16,458. "Burglar alarm." L. A. de Becker. June 25th, 1925. (258,669.)

16,718. "Frequency standards." Standard Telephones & Cables, Ltd. (formerly Western Electric Co., Ltd.). July 9th, 1924. (236,921.)

16,953. "Control of electric motors." British Thomson-Houston Co., Ltd., and R. D. Given. July 1st, 1925. (258,687.)

17,048. "Apparatus suitable for use with sound transmitting or recording apparatus." E. A. Graham (deceased). July 2nd, 1925. (258,690.)

17,051. "Wired broadcasting system." Standard Telephones & Cables, Ltd. (formerly Western Electric Co., Ltd.). Western Electric Co., Inc. July 2nd, 1925. (258,691.)

17,838. "Variable electric condensers." L. H. Bainbridge-Bell and Radio Communication Co., Ltd. July 11th, 1925. (258,700.)

17,882. "Electric transformers." J. P. Keith, J. Cruwys, and Power Equipment Co., Ltd. July 13th, 1925. (258,701.)

17,975. "Sound-producing instruments." J. Roston. July 14th, 1925. (258,702.)

18,186. "Piezo-electric frequency control devices. Standard Telephones and Cables, Ltd. (formerly Western Electric Co., Ltd.). August 26th, 1924. (239,175.)

19,037. "Radio receiving systems." Standard Telephones & Cables, Ltd. (formerly Western Electric Co., Ltd.) (Bell Telephone Laboratories, Inc.). July 27th, 1925. (258,707.)

19,183. "Transformers." Lissen, Ltd., and R. P. Richardson. July 28th, 1925. (258,710.)

20,061. "High-frequency electric signalling and remote control systems." J. W. Kirkland (Allgemeine Elektricitats Ges.). August 10th, 1925. (258,712.)

20,080. "Reinforced-concrete post for the support of electric or other cables and the like." Concrete Utilities, Ltd., and C. Marques. August 10th, 1925. (258,713.)

20,767. "Thermionic valve circuits." Electrical Improvements, Ltd., and L. C. Grant. August 19th, 1925. (258,718.)

20,859. "Electrical hot-plates." Cables Accessories Co., Ltd., F. H. Reeves and S. F. Bickell. August 20th, 1925. (258,721.)

22,165. "Process for the electrodeposition of chromium." C. L. Long, D. J. Macnaughton, and G. E. Gardam. September 4th, 1925. (258,724.)

22,217. "Electromagnetically actuated hammers, drills, vibrators, and other reciprocating or vibrating tools or devices." P. Grant. September 5th, 1925. (Cognate applications 27,293/25 and 29,183/25.) (258,725.)

22,299. "Electro-chemical process for cleaning and polishing silver, plate and the like." Polivit Manufacturing Co., Ltd. (F. J. M. Valentin). September 7th, 1925. (258,726.)

23,009. "Method of and means for synchronising rotating bodies." C. Lorenz Akt.-Ges. September 25th, 1924. (240,442.)

23,176. "Construction of electric-motor ceiling fan." Veritys, Ltd., and A. Lanz. September 17th, 1925. (258,730.)

23,634. "Attachments for telephone earpieces." P. J. Pearsall and G. S. Oddie. September 22nd, 1925. (258,732.)

23,750. "Rotary distributor or timer for the ignition system of motor vehicles." E. W. Turner. September 23rd, 1925. (258,733.)

25,123. "Definite time-limit electric relays." British Thomson-Houston Co., Ltd. October 21st, 1924. (241,883.)

25,801. "Method of and means for utilising electric current from power mains for wireless apparatus." E. Heese. October 15th, 1925. (258,739.)

25,938. "Method of mounting insulators." S. A. M. Rose. October 16th, 1925. (258,742.)

27,532. "Crystal detectors for use in wireless apparatus." Partridges, Ltd., and H. Mills. November 2nd, 1925. (258,746.)

31,324. "Construction of electrically-operated ladle cranes for steel foundries and the like." Ateliers de Constructions Electriques de Charlerol. March 25th, 1925. (249,815.)

1926.

600. "Aerial system for wireless transmitting and receiving instruments." F. A. Trengrove. January 9th, 1926. (258,764.)

1,132. "Electric arc welding arrangements for three-phase current. H. A. W. Klinkhamer. March 19th, 1925. (249,477.)

2,571. "Automatic telephone exchange systems." Standard Telephones and Cables, Ltd. (formerly Western Electric Co., Ltd.). (G. Deakin and L. Polinkowsky.) March 25th, 1925. (Divided application on 8,070/25.) (258,775.)

5,984. Electrically-heated vessels." British Thomson-Houston Co., Ltd. (General Electric Co.). March 3rd, 1926. (258,785.)

6,117. "Electric measuring instruments." British Thomson-Houston Co., Ltd. (General Electric Co.). March 4th, 1926. (258,787.)

8,083. "Arc-rupturing devices for electric circuit-interrupting apparatus." Metropolitan-Vickers Electrical Co., Ltd. March 26th, 1925. (249,870.)

10,253. "Electric switch contacts." Landis & Gyr Soc. Anon. July 1st, 1925. (254,682.)

10,719. "Electric cells or batteries." A. H. Sheppard and Ever-Ready Co. (Great Britain), Ltd. April 23rd, 1926. (258,807.)

10,979. "Systems of speed control for electrical machinery." R. Lilgeblad and Allmanna Svenska Elektriska Atkiebolaget. April 26th, 1926. (258,810.)

11,092. "Electrodes for electron-discharge tubes or thermionic valves." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. June 8th, 1925. (253,084.)

12,701. "System for the improvement of the power factor of electric welding and other reactance controlled circuits." British Thomson-Houston Co., Ltd. May 18th, 1925. (252,209.)

13,040. "Phonographs and the like and radio receivers." Marconi's Wireless Telegraph Co., Ltd. June 12th, 1925. (253,504.)

13,433. "Electric control systems." British Thomson-Houston Co., Ltd. May 27th, 1925. (252,726.)

14,065. "Transformers." British Thomson-Houston Co., Ltd. June 3rd, 1925. (253,125.)